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From Reporting to Analytics:

Leveraging Business Intelligence in enabling organisations' transformation towards becoming data-driven.

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ABSTRACT:
Today, the world contains an unimaginably massive amount of digital information, increasing ever so rapidly and bringing about a wide range of opportunities across industries such as predicting future trends, combating crime to name a few. As a result, more and more organisations are investing heavily in Business Intelligence (BI) with the hope of gaining insights through data and analytics and hence become data-driven. However, despite the massive investment in BI many organisations still struggle in becoming data-driven. Thus, in this study we explore how organisations can transform to become data-driven by leveraging BI. A qualitative study was conducted with subject experts responsible for managing data, business intelligence and analytics. The findings of these study indicate that enabling a data-driven organisation is not a technological challenge anymore, rather more of an organizational challenge. It has been noted that top management support in the form of leading by example in using analytical tools in everyday tasks, engaging users/employees right from the start, capability building and making analytical tools simple and engaging are key to enabling a data-driven organisation. Furthermore, when top-managers lead by example in using analytical tools, they become the champions in their department and hence instil a data-driven culture organisation-wide.
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Qinyan & Robi

An expression of gratitude to my beloved daughter who makes my life full of love, and her super daddy whose support and help make all this possible. My gratitude also goes to my mum and dad for their understanding and support.

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I am forever grateful for the gift of life, for family and friends. Special thanks to my husband and children for their understanding and the love and support they gave me during the whole period of studies. I would also like to thank my mom and dad for their prayers and for being there for me whenever I needed them, my friends for their encouragement. And lastly, my fellow students for all the knowledge, laughter and sometimes frustrations shared during our studies. My life has become so much fuller.

Robi Morro

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1 Introduction

1.1 Background

In the past, organisations relied on simple analysis of the balance sheet to understand their businesses and focused on company's future expected revenues and profits. The only way to gauge future growth potential, determine customer loyalty or develop new products was based on assumptions while relying on past history. Today, the continuing progress in information technology has been so rapid and so surprising that many present-day organizations and institutions cannot afford to rely on just simple reports that are often a declaration of the past or present with not much context or an explanation why something has happened (Brynjolfsson & McAfee, 2012; Davenport & Harris, 2007). This is due to the constant flux of data generated from not just mobile phones, but also cars, different appliances, machines and 'things' making everything around us turn into data (Delen & Demirkan, 2013). Thus, leading to enterprises to rely more on data to gather business intelligence in real-time to remain competitive (Davenport, 2006). Data is now fully dynamic and lies in the heart of these new business models (Gillon, Brynjolfsson, Mithas, Griffin, & Gupta, 2012). As a result, the need for organisations to become data-driven has become crucial for many modern businesses today (The Economist, 2010).

The rise in popularity of 'the data-driven organisation' is due to the influx of data caused by the ubiquitous in information technology (Anderson, 2015). Cars, mobile phones, the internet of things, machines and a growing number of other appliances constantly generate data (The Economist, 2010). Data is no longer owned by enterprises and it's created by everyone: vendors, customers, suppliers, partners, managers, executives, strangers, bloggers, and vagabonds, and anyone else that would like to offer insights, solve problems, or buy things (Andriole, 2012). As a result, the world contains an unthinkable amount of data which is also increasing at a very fast pace. This makes it possible to do many things that previously could not be done: spot business trends, prevent diseases, combat crime and so on (The Economist, 2010). Data is now treated as a highly valuable enterprise resource, and transformed from quantity to quality (Luhn, 1958). From this perspective, when managed well, data can be used to unlock new sources of economic value, provide fresh insights into science and hold governments to account (The Economist, 2010). Thus, many companies today are turning to Business Intelligence (BI) in an attempt to become more data-centric, identify new sources of value that exist in an organization and that can be exploited to cultivate future opportunities for value creation and protection (Golfarelli, Rizzi, & Cella, 2004a). This is evidenced in the Gartner recent survey of 3000 CIOs showing that CIOs ranked analytics and BI as the top differentiating technology for their organizations (Gartner, 2017). It attracts the newest investment and is also considered the most strategic technology area by top-performing CIOs adds Gartner Gartner (2017).

According to Kalakota and Robinson (1999) BI is one of the prominent information system that has been widely used for data and analytics. BI is about insight, interpretation, forecasting, planning, and adaptation (Watson & Wixom, 2007). It is indicated that BI facilitates the realization of business objectives through reporting of data to analyse trends, creating predictive models for forecasting and optimizing process for enhanced performance (Negash, 2004). In addition, the main tasks of a BI system include "intelligent exploration, integration,

aggregation and a multidimensional analysis of data originating from various information resources" adds Jermol, Lavrac, and Urbancic (2003). This implies that massive data from many different sources of a large enterprise can be integrated into a coherent body to provide '360 degrees' view of its business (Bose, 2009; Wang & Wang, 2008). Therefore, meaningful information can be delivered at the right time, at the right location, and in the right form (Bose, 2009; Negash, 2004) to support individuals, departments, divisions or even larger units to enable organisation in becoming data-driven (Jagielska, Darke, & Zagari, 2003). BI is changing from being a tool used by a few specialists to one that is used by many workers argues Watson and Wixom (2007). It is changing from focusing solely on the analysis of historical data to including the capture and use of real-time data to impact current, operational decisions (Wixom & Watson, 2010).

Most organizations today recognize that analytics has great potential to create value (Marchand & Peppard, 2013). Even though the perceived value of data has increased over the last two decades and the investment in BI applications and tools has increased, many companies are overwhelmed with data and still struggle with capturing, sharing and managing data, and thus transform to a data-driven organisation (Watson, 2008). It is often not clear how to align people, processes and technology with the new transformation (Pedersen, 2015). This is evidenced by a recent report from EY revealing that whilst 81% of organizations support the notion that data should be at the heart of everything they do, the clear majority continue to keep data in silos, thus strangling their efforts at birth (Ernest & Young & Nimbus, n.d.). On the same view, other challenges that organisations face are such that many people in organisations are still uncomfortable working with data, hence despite acquiring sophisticated analytical tools, no one pays any attention in understanding how to use the information it generates to make better decisions or gain a deeper and unanticipated insight into key aspects of the business (Marchand & Peppard, 2013). Furthermore, most companies still run legacy systems operating in silos, have difficulties in capturing full potential of data and BI due to internal policies or regulations and lack of skilled employees with analytic capability to name a few (Marchand & Peppard, 2013). The need for organisations to realise the benefits of BI is becoming paramount (Olszak, 2016). From this perspective, it is thus crucial to understand how BI can be leveraged in enabling organisation transformation towards becoming data-driven.

1.2 Problem area

Even though the perceived value of data has increased over the last two decades and the investment in BI applications and tools has increased, many organisations still struggle to effectively use BI and thus transform into a truly data-driven organisation (Marchand & Peppard, 2013). The information systems (IS) literature has long emphasized the positive impact of information provided by BI on decision-making and enabling businesses to rely more on data to generate knowledge and achieve business goals (Kowalczyk & Buxmann, 2014; Kudyba & Hoptroff, 2001; Liautaud & Hammond, 2000; Luhn, 1958; Negash, 2004; Olszak, 2013; Peco, 2016). However, literature on how to leverage BI in enabling data-centric or data-driven organisations have remained largely unexamined in academic IS research, rather widely discussed in practitioner-oriented literature (Abai, 2006; Anderson, 2015; Bill Hostmann, 2009; Ernest & Young & Nimbus, n.d.; Pedersen, 2015). This indicate a lack of scientific studies on how BI is leveraged to enable data-driven organisations. This gap was also revealed by Wixom and Watson (2010) when analysing BI based organisations. The authors revealed how leaders are struggling with how to organize their IT organizations to address this shift. They

indicated that research is needed to understand effective ways for building organizational analytical capabilities through BI (Wixom & Watson, 2010). Thus, this indicates the gap in theory regarding a comprehensive view of what factors can be considered in leveraging BI to enable organisation transformation towards becoming data-driven.

1.3 Research question

In order to fill the gap on the lack of research and explore further how organisations can leverage BI to transform towards becoming data driven, the research aims at answering the following research question:

"What are the critical success factors for leveraging BI to enable an organisation transformation towards becoming data-driven?"

This will be analysed by examining two primary aspects:

- The rationale for BI adoption and the determinants that contribute to BI use
- How the identified determinants for BI use may contribute to organisation transformation towards becoming data-driven.

1.4 Purpose

The purpose of this study is to explore critical success factors that organisation may consider when transforming towards becoming data-driven through leveraging BI. This is based on analysing the BI literature, in particular the rationale for using BI and the generic BI environment as proposed by Wixom and Watson (2010), and generating the factors through the critical success factors theory (Rockart, 1979). The organisation transformation towards becoming data-driven is a complex undertaking requiring considerable resources (Wells, 2008). Yet there are limited studies from academia in this area for management reference. Thus, this study seeks to bridge the gap that exists between academia and practitioners by investigating the CSFs influencing organisation transformation towards becoming data driven through leveraging BI. We conduct an exploratory study through qualitative interviews with subject expert. We believe that it is important for both researchers and practitioners to obtain a deeper understanding of how to go about their data literacy and insights driven efforts. Such understanding will shorten the time organizations will need to achieve successful BI use and overall become data-driven in the long run.

1.5 Delimitation

This study is delimited to how organisations can leverage BI in order to transform towards becoming data driven. BI plays a critical role towards enabling and transforming organisations to become data-driven or data-centric through its capabilities (Watson & Wixom, 2007). Thus, the study is based on analysing BI literature to understand its role in enabling data-driven organisations. From this perspective, literature on BI shows "separation" between technical and organisational approaches, tracing two broad patterns (Kalakota & Robinson, 1999;

Kudyba & Hoptroff, 2001; Liautaud & Hammond, 2000; H. J. Watson & B. H. Wixom, 2007; B. H. Wixom & Watson, 2001). From technical point of view BI is an integrated set of tools, technologies and software products that are used to collect heterogenic data from dispersed sources and then to integrate and analyse data to make them commonly available (Kudyba & Hoptroff, 2001; H. J. Watson & B. H. Wixom, 2007; B. H. Wixom & Watson, 2001). In this viewpoint, BI focuses on the technologies that allow the recording, recovery, manipulation and analysis of information. From organizational perspective, BI means a holistic and sophisticated approach to cross-organizational decision support (Kalakota & Robinson, 1999; Liautaud & Hammond, 2000; Moss & Atre, 2003; Olszak, 2013). The role of BI here is to create an informational environment in which operational data gathered from transactional systems and external sources can be analysed, in order to reveal "strategic" business dimensions (Petrini & Pozzebon, 2009). The organisation perspective of BI is more in line with enabling data driven transformation and hence fits the purpose of this study. Thus, it must be noted that this study does not aim to explore the technological approach of BI which focuses on technologies nor does it aim to go into technological details of BI rather focuses on the role of BI from organisational perspective.

2 Theoretical Background

This chapter summarises the key supporting literature that form the foundational basis of this study. The chapter describes the core concepts and theories which forms the theoretical basis for our conceptual framework to be used for analysis and empirical findings.

2.1 Critical success factors (CSF)

CSF theory has been successfully used by many IS researchers to understand the alignment of new systems with organisation objectives. The theory as an information systems methodology was first used as a mechanism for defining a chief executive officer's information needs (Rockart, 1979). Rockart (1979) argues that there are particular areas of activities that should be constantly and carefully managed by an enterprise if the business is to survive and flourish (Rockart, 1979). From this perspective, Rockart (1979) stressed two key points: CSFs must provide a focal point for directing a computer-based information system development effort and that CSF method should result in an information system useful to a CEO as it pinpoints key areas that require a manager's attention. In support of the view, argue that CSF method generates user acceptance at senior management level leading senior management providing overall required support influencing system use in organisations.

Based on our literature review, we found that the CSF theory has consistent empirical support in various IS domains, such as strategic information systems planning (Ang & Teo, 1997), knowledge management (Yew Wong, 2005), customer relationship management (Kim, Lee, & Pan, 2002; Mankoff, 2001), supply chain management (Ngai, Cheng, & Ho, 2004), portals (Remus, 2006), manufacturing resource planning (Maxie Burns, Turnipseed, & Riggs, 1991), quality management (Arumugam, Mojtahedzadeh, & Malarvizhi, 2011; Black & Porter, 1996), strategic business alliances (Wittmann, Hunt, & Arnett, 2009) and e-learning (Selim, 2007). In the context of Business Intelligence systems, CSFs can be perceived as a set of tasks and procedures that should be addressed to ensure successful BI implementation (Scholz, Schieder, Kurze, Gluchowski, & Böhringer, 2010). These tasks and procedures would either to be fostered, if they had already occurred, or be worked out, if they were non-existent. From this viewpoint, this study finds CSF theory (Rockart, 1979) as a useful starting point for looking into factors that affect how BI is leveraged to enable organisation transformation towards becoming data-driven. **Table 2.1** summarises the BI CSF in the literature.

Table 2.1: A summary of BI Critical success factors

CSF	Author
Management support, Champion, Architecture (data marts), Organisational Fit/User acceptance.	(Chenoweth, Corral, & Demirkan, 2006)
Fast implementation, Ability to adjust to business requirements, Useful information, Ease of navigation.	(Farley, 1998)

Project-related factors (project plan must match with business demands and the scope of project management), Technical factors (DBMS selection, data loading, and efficiency of data access, etc.)	(Joshi & Curtis, 1999)
Management support, Enterprise approach, Prototyping data warehouse use, Metadata, Sound implementation methodology, External support (consultants).	(Little & Gibson, 2003)
Data quality, Technology fit, Management support, Defined business objectives, User involvement, Change management.	(Mukherjee & D'Souza, 2003)
Technical factors (data quality and data consistency, etc.).	(Rudra & Yeo, 2000)
Adequate resources including budgetary and skills, Data quality, Flexible enterprise model, Data stewardship, Strategy for automated data extraction methods/tools, Integration of data warehouse with existing systems, Hardware/software proof of concept, Business driven approach, Management support.	(Sammon & Finnegan, 2000)
Management support, Adequate resources, Change management, Metadata management.	(Watson & Haley, 1997)
Data quality, System quality, Management support, Adequate resources, User participation, Skilled project team.	(Wixom & Watson, 2001)
Management support, Clear vision and business case, Business champion, Balanced team, Iterative development approach, Change management, Suitable technical framework, Data quality.	(Yeoh & Koronios, 2010)

2.2 From reporting to analytics: Data-driven organisations

IS have had a fundamental impact on transforming organisations (Henderson & Venkatraman, 1993). The famous success stories in airlines, finance and several other industries in the mid-1980s and 1990s were all rooted in IS-enabled business transformations (Porter & Millar, 1985). There is little doubt about the potential role of IS in influencing, enhancing and extending organisation transformation to become more efficient and innovative (Henderson & Venkatraman, 1993). BI can be regarded as an information system that provides the technological foundation to build analytics capabilities in organisations and hence enable organisation to transform their businesses into data-driven operations (Chiang, Goes, & Stohr, 2012). In a decision-support context, BI systems have emerged as a technological solution offering data integration and analytical capabilities to provide stakeholders at various organizational levels with valuable information for their decision-making (Turban, Sharda, & Delen, 2010). As the competitive landscape is changing many organisations regard BI not just as an innovative system for analysing data and generating information but also as a requirement for competing in the marketplace (Davenport, 2006). Business functions such as marketing, production, product delivery, procurement, customer service, human resources (HR) and IT can draw

on widely used business intelligence (BI) system solutions. Accordingly, BI systems when utilised at its highest capacity, can enable organisations mature from using descriptive quantitative data analyses to explain what is happening now through predictive analyses to estimate what will happen in the future to prescriptive analyses using management science tools to help decide what to do next (Anderson, 2015; Eckerson, 2004; Golfarelli et al., 2004a).

Thus, from this perspective, BI plays an important role in enabling analytics capabilities in organisations. Organisations build their analytic capabilities when they transform from using reporting based on past event to analytics that explains what is happening now and in the future (Anderson, 2015). In this way they the organisations becomes "data-centric" or in this study referred to as "data-driven" (Abai, 2006). An organisation transforms into a data-driven organisation its ultimate goal is utilizing BI at its highest capacity and as a strategic enabler necessary to enable fact-based decision making and knowledge generation (Wixom & Watson, 2010). In a data-driven organisation, BI plays a major role in their operations and overall business success (Anderson, 2015). The role of BI according to Kowalczyk and Buxmann (2014) is to provide the quality information in well-designed data stores, coupled with business-friendly software tools that provide knowledge workers timely access, effective analysis and intuitive presentation of the right information, enabling them to take the right actions or make the right decisions. On the same note, Watson (2006) argue that the organisation's rationale or target for using BI will reflect upon organisation transformation in becoming data-driven. The transformation towards data driven is through persistent use of BI as a strategic enabler (Wixom & Watson, 2010).

2.3 Rationales for using BI

Watson & Wixom (2007) argue that organisations have different rationale when using BI and these rationales differ in terms of their focus; scope; level of sponsorship, commitment, and required resources; technical architecture; impact on personnel and business processes; and benefits. For instance, some focus on a few data marts with applications that meet very specific important purposes such as marketing campaign management or buyer behaviour analysis, while other go overboard and invest in multi-million-dollar enterprise data warehouses that support enterprise-wide BI usage for strategic business objectives (Watson, 2006).

Table 2.2: Different rationales for using BI (Wixom & Watson, 2010)

	Singe or a Few Application	BI Infrastructure	Organisation Transformation
Strategic vision	Satisfy a business unit need.	Provide an organisation-wide resource.	Fundamentally change how the business is run.
Focus	Applications that satisfy particular business units needs.	Infrastructure that is used by applications across the organisation.	Support and enables a new strategic business model.
Level of commitment	Low to medium.	High	Very high

Sponsorship	Business unit	CIO and business units.	All C-level executives.
Required resources	Low to medium	High	Very high
Impact on people and processes	Low to high at the business unit level	Provides the infrastructure that can generate high returns.	Fundamentally changes peoples jobs, work processes and the organisational culture.
Benefits	Low to high at the business unit level.	Provides the infrastructure that can generate high returns.	Makes the new strategic business model possible.

Table 2.1 highlights three specific rationale for using BI (Goodhue, Wixom, & Watson, 2002) such as adopting a single or a few BI applications for a specific need, adopt BI with the purpose of creating an infrastructure for BI and BI adoption with the aim of achieving organisation transformation. When an organisation adopts BI for a specific need, the main strategic vision is to satisfy a particular business need such as to run effective marketing campaigns and may implement a data mart and campaign management software and applications to address this need (Watson, 2006). Such particularly initiatives are usually sponsored by the business unit and do not require much resources. Therefore, the impact and benefits of such initiatives are limited to the business unit level. Other organisations aim to create an infrastructure for BI by defining and cleaning up their data, establishing efficient processes to move data from source systems to a highly extensible data warehouse, implementing a variety of BI tools and applications, and investing in BI user training (Watson, 2006). A third rationale is adopting BI for organizational transformation whereby organisation undergo significant process change and use BI to run the organisation differently (Watson, 2006). Recently, more and more attention has been paid to the last above target (Olszak, 2016). It is argued that BI systems cast some light on information that may serve as the basis for carrying out fundamental changes in organisations (Wixom, Watson, & Werner, 2011). Thus, through leveraging BI combined with other factors may enable organisation transformation towards becoming data-driven.

2.4 Business Intelligence

Historically, BI has been evolving approximately over the last 40 years and can be traced back from decision support systems, when managers used computer applications to model business decisions (Watson & Wixom, 2007). Early versions of analytical software packages appeared on the market in the 1970s (Watson & Wixom, 2007). The popular spreadsheet software, e.g., Excel, was released in the 1980s and is still widely used today. By the mid-1980s and early 1990s, so-called executive information systems Tornatzky, Fleischer, and Chakrabarti (1990) were presented and quickly grew in popularity by promising to provide top management with easy access to internal and external information relevant to decision-

making needs, placing “key information on the desktops of executives” (Rasmussen, Goldy, & Solli, 2002).

The popularity was due to user-friendly interfaces and powerful analytical functionalities of these systems. Similar factors accounted for the popularity of decision support systems (DSS), i.e., software developed to support exception reporting, stop-light reporting, standard repository, data analysis and rule-based analysis (Petrini & Pozzebon, 2009). As computer hardware and software matured, enterprises also grew ever-more sophisticated in their computational and analytical needs (Watson & Wixom, 2007). As a result, the capabilities of each new iteration also increased (Negash, 2004). In the 1990s, three technological improvements such as data warehouse technologies, ETL tools (extraction, transformation and loading) and powerful end-user analytical software with online analytical capabilities (OLAP) brought about a revolution in analytical applications scenarios, accounting for the emergence of business intelligence (BI) systems (Negash, 2004). Furthermore, the impact of the rapid development of the internet is far from negligible: current versions of analytical products are web-based, and, through Internet or intranet connections, users can investigate and analyse data from anywhere (Carlsson & Turban, 2002). Today, terms like DSS and EIS have been replaced by BI as a term used to describe analytical and strategic information systems especially in the world of practice (Watson & Wixom, 2007).

2.4.1 The definition of BI

There exist many definitions of BI today for example, Chaudhuri, Dayal, and Narasayya (2011) defines BI as *systems to “provide the ability to analyse business information in order to support and improve management decision making across a broad range of business activities.”* In addition, Wixom and Watson (2010) defines BI as *“a broad category of technologies, applications, and processes for gathering, storing, accessing, and analysing data to help its users make better decisions.”* These two definitions warrant a good discussion for this study. BI uses technologies to gather data from source systems, store the data, and then uses applications to access and analyse the data and transform the data into useful information and knowledge (Negash, 2004; Wixom & Watson, 2010). Furthermore, BI assist organisations in performing analysis and prediction, which facilitate a wide range of strategic decisions from adopting new business models to launching a new product line (Saxena & Srinivasan, 2013). BI has therefore evolved from being a contributor to organisational success to becoming a necessity for organisational survival (Watson & Wixom, 2007). This is especially true in this digital era, where by the need to become data-driven is crucial for organisational performance and competitiveness in the marketplace (Watson & Wixom, 2007). As stated by Mr. Rowsell-Jones of Gartner *"Data and insight drive the creation, delivery and life cycle of digital products and services. Flow of information in the context of user interactions leads to better engagement and value creation for all parties.” (Gartner, 2017)* In line with the view, Wells (2008) argue that BI provides an organisation the ability to reason, plan, predict, solve problems, think abstractly, innovate and learn in ways that increase organizational knowledge, inform decision processes, enable effective actions, and help to establish and achieve business goals.

2.4.2 BI environment

Figure 2.2 shows a best practice BI environment for organisations as adopted from Wixom and Watson (2010). BI environment includes both getting data in from different source systems to a data mart or warehouse (the left side of the diagram) and getting data out (the right side of the diagram) through BI applications and technologies to meet a business purpose. The process of getting data in involves collecting data from different source systems such as ERPs, Web 2.0 collaborations, emails, Word documents, and social media. This process of extracting data from the sources is also known as ETL and it consists of matching, integrating, and aggregating data and transform it to the data-warehouse. Due to the different sources of data available today, the need for data integration as a BI capability is crucial to enable this process.

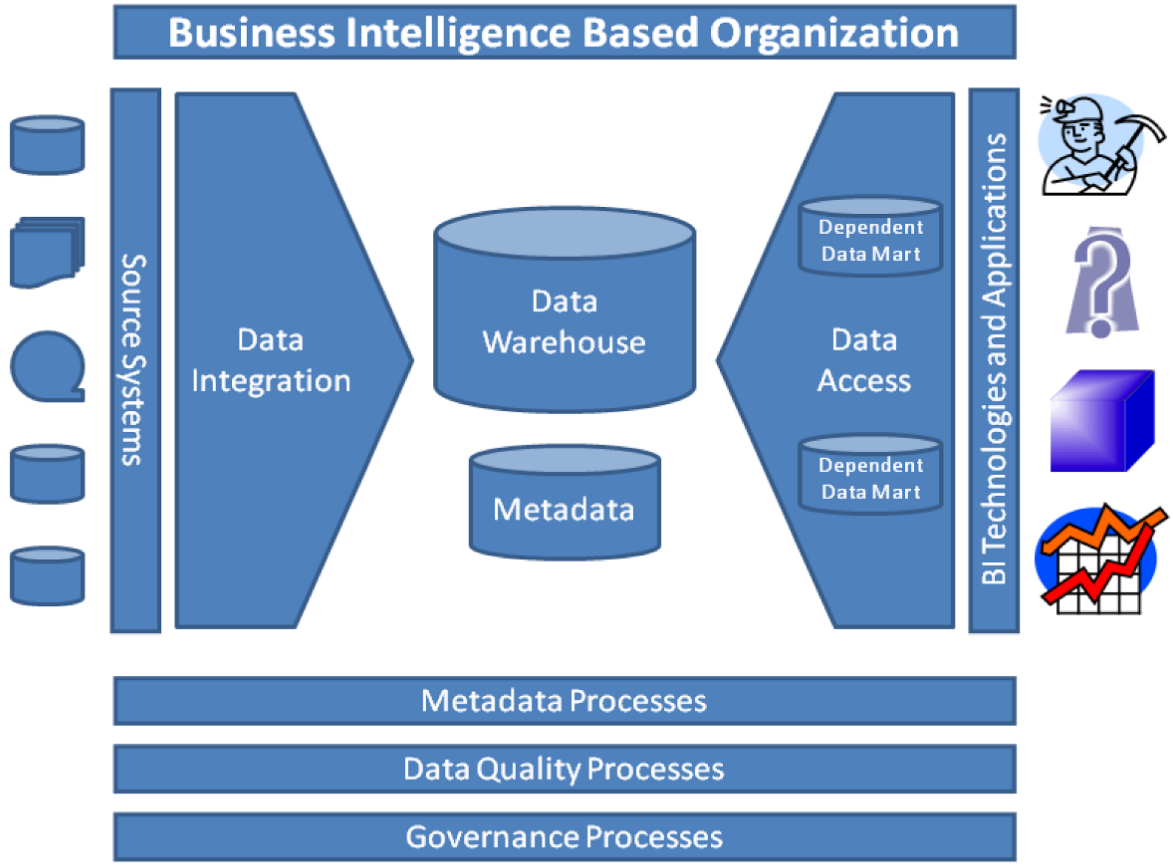


Figure 2.1: Generic BI Environment (Wixom & Watson, 2010, p. 15)

Apart from data integration that enable data extraction from source systems into data warehouse, the data needs to be extracted out and converted into useful insight and made available to the users. During the activity of getting data out, the right side of diagram indicates the variety of users such as Data miners, analysts and business users who extract value from the data (Wang & Wang, 2008; Watson & Wixom, 2007). To enable this, the BI capability of user access is critical. Many organisations aim to make the use of BI more pervasive through making it available to more people across the organisation and externally to customer and suppliers.

Potential BI applications include SQL queries, drillable reports, OLAP, EIS, dashboards/scorecards, alerts, and data mining/predictive analytics, however the study of these technologies is out of the scope of this study.

Furthermore, the BI environment also includes metadata, data quality, and governance. According to Wixom and Watson (2010), it is important to have metadata that supports both the IT people who get data in and users who get data out. Moreover, data quality affects how users will be willing to use the data warehouse (Wixom & Watson, 2001). If the quality of the data is low, the warehouse will not be used in the long term (Yeoh & Koronios, 2010). Therefore, apart from technology, people and processes are also key to the BI environment. Governance includes the people, committees and processes that ensure that BI meets organizational goals (Negash, 2004). Thus, the BI environment, provide organisations with the key capabilities that plays a critical role in the organisational transformation towards becoming data-driven.

2.4.3 BI capabilities

Adapting to today's rapidly changing business environment driven by massive generation of data, BI plays an important role in enabling organisations to become data-driven with the capabilities it provides (Ramakrishnan, Khuntia, Kathuria, & Saldanha, 2018). According to IşıK, Jones, and Sidorova (2013), the extent to which an organization can leverage BI is related to the capabilities of its BI system. Furthermore, research suggests that a lack of fit between an organization's BI and its goals and characteristics is one reason for a lack of success in leveraging BI (Lönnqvist & Pirttimäki, 2006; Marchand & Peppard, 2013; Olszak, 2014; Watson, 2008). Thus, with the right capabilities, BI can help an organization achieve the transformation towards strategic BI use in predict changes in product demand or detect an increase in a competitor's new product market share and respond quickly by introducing a competing product (Ramakrishnan et al., 2018; Watson & Wixom, 2007). From this perspective, this study views BI as a key technological context and aims at exploring BI capabilities as the technological factors.

BI capabilities are critical functionalities of BI that help an organization improve its adaptation to change as well as improve its performance (Watson & Wixom, 2007). The capability have their roots in the IT capabilities which are derived from the resource-based view (RBV) (Bharadwaj, 2000). However, the details of how these capabilities have been derived from the RBV requires another study and is outside of the scope of this study. It is argued that BI capability can be viewed from both organizational and technological perspectives similar to IT capability as argued by (Sabherwal & Kirs, 1994; Sambamurthy & Zmud, 1997). Technological BI capabilities are sharable technical platforms and databases that ideally include a well-defined technology architecture and data standards, the sources from which the data are obtained, data types, data reliability, user access in terms of authorization and/or authentication, while organizational BI capabilities are assets that support the effective application of BI in the organization, such as flexibility and shared risks and responsibilities (Isik, Jones, & Sidorova, 2011). Table 2.2. below summarises a list of BI capabilities and their definition.

Table 2.3: A summary of technological and organisational BI capabilities

Dimension	BI capability	Definition	Reference
Technology	Data Quality	The capability of BI to manage data that needs to be interpreted for analysis purposes in an accurate, comprehensive and consistent way.	(Sukumaran & Sureka, 2006)
	External data reliability	The capability of BI to provide and manage external data without any conflicts, inconsistencies, in a reliable and up-to-date manner.	(Hostmann, Herschel, & Rayner, 2007)
	Internal data reliability	The capability of BI to provide and manage internal data without any conflicts, inconsistencies, in a reliable and up-to-data manner.	(Parikh & Haddad, 2008)
	Internal data source quality	The capability of BI to store, retrieve and disseminate data from internal data sources such as data warehouse, a data mart, or an online analytical processing (OLAP) cube in a concise, available and readily usable manner.	(Harding, 2003)
	External data source quality	The capability of BI to store, retrieve and disseminate data from external data sources such as websites, spreadsheets, suppliers and vendors in a concise, available and readily usable manner.	(Harding, 2003)
	Integration with other systems	The capability of BI to provide enterprise business integration through a unified view of business data, business processes and business applications by managing the flow of events as well as a single personalised interface to the user.	(White, 2005)
	User Access	The capability of BI to manage different information access mechanism to provide the right users the right capabilities.	(Hostmann et al., 2007)
Organisation	Flexibility	The capability of BI to provide decision support when variations exist in the business process, technology or the business environment in general.	(Gebauer & Schober, 2006)
	Risk management support	The capability of BI to support decision making under conditions of	(Harding, 2003)

		uncertainty when all the facts are not known.	

According to Isik et al. (2011) only five capabilities have shown to positively affect successful B use in organisations. These capabilities are such as data quality, better user access quality, higher flexibility, and better risk management support, and stronger interaction with other systems. Most decisions require sound data quality that can be pulled from a variety of systems to good user accessibility and require some degree of flexibility in the decision-making process (Hostmann et al., 2007). These basic capabilities form the foundation of a useful, or successful BI use in organisations (Isik et al., 2011).

2.5 BI capabilities and BI use

From Isik et al. (2011) view, it implies that the five BI capabilities will impact how BI will be successful used in organisations. We proceed to look at how each of these key BI capabilities affect BI use.

Data Quality: refers to the consistency and comprehensiveness of the data (Giovinazzo, 2003). Research argue that clean and relevant data is one of the most important BI success factors (Eckerson, 2004; Joshi & Curtis, 1999). BI systems today have the capacity to work with different types of data such as structured and unstructured data for which the quality is equally critical (Negash, 2004). The difference in the level of data quality is one of the factors that may explain why some organizations are successful with their BI initiative while some are not (Ariyachandra & Watson, 2006). This is due to that BI is only as good as the data it provides. Therefore, for BI to be useful and valuable to a decision-making process, and to enable organisation transformation, data must reflect a high degree of quality (Even, Shankaranarayanan, & Watts, 2006; Herring, 1992).

User Access: This capability relates to the extent which the user can access the information they need for decision making with BI (IşıK et al., 2013). While some organizations limit user access through practising authorization and access control, others prefer to allow full access to all types of users through a web-centric approach (Hostmann et al., 2007). Due to that one size does not fit all with BI, Organizations may need to deploy different BI tools from different vendors due to different reporting and analytics needs of different groups of users in the organisation. (Howson, 2006). Thus, is crucial to match BI tool with user type and provide access according to user roles despite the type of BI application that organisation uses (Isik et al., 2011).

Integration with other systems: refers to the capability of BI to provide enterprise business integration through a unified view of business data, business processes and business applications by managing the flow of events as well as a single personalised interface to the user (White, 2005). Many organizations prefer having IS applications interacting at multiple levels so that enterprise business integration can occur (Sammon & Finnegan, 2000). Furthermore, the growing number and variety of data sources for BI in many organizations lead to increasing pressure on the integration between the systems from which the data are sourced (Sammon & Finnegan, 2000). This integration can be at the data level, application level, business process level or user level, yet these four levels are not isolated from each other (White,

2005). For organizations that use data from multiple sources and feed the data to multiple information systems, the quality of communication between these systems directly affects the overall system use (Swaminathan, 2006). Therefore, for a new implemented system to be used successful and accepted in the organisation, it must be fully integrated into work processes (Watson & Wixom, 2007). In support of the view, Markus (1983) argues that introducing a new Information system in the organisation can cause a considerable organisation change, that people tend to resist. The higher the magnitude of changes that the system creates, the more the likelihood of this resistance adds Markus (1983) BI, in particular, has profound effects on organizations because it can shift data access patterns, use and ownership, leading to changing how jobs are performed; and modify business processes (Gillon et al., 2012). In addition, it may move data ownership from the functional areas to a centralized group which will result into a shift of responsibilities for data access from information systems personnel to end users (Negash, 2004). This as a result may lead to changes how users perform their jobs as a result of having access to warehouse data and allows businesses to operate differently (Negash, 2004). These changes potentially lead to resistance from end users, managers and data suppliers (Wells, 2008). Thus, organizations must find ways to successfully manage integration within BI systems and between BI and other information systems for successful leverage of BI (Isik et al., 2011).

Flexibility: refers to the capability of BI to provide decision support when variations exist in the business processes, technology or the business environment in general (Gebauer & Schober, 2006). Though technology does not always support exceptional situations, organizations still need the flexibility and robust functionality to obtain the optimum potential from BI (Isik et al., 2011). The amount of flexibility directly impacts the use of a system: while too much flexibility may increase complexity and reduce usability, insufficient flexibility may prevent using the system for certain situations (Gebauer & Schober, 2006). It is thus important that BI provides the necessary flexibility in the decision-making process, especially for applications or processes dynamism is required (Sergey & Tienan, 2013).

Risk Management support: refers to the capability to support decisions under conditions of uncertainty (Harding, 2003). Risk and uncertainty exist in every business decision, and organizations may use BI to minimize uncertainty and make better decisions (IşıK et al., 2013). In particular, organizations which have specific and well-defined problems to solve have a low tolerance for risk and thus may be using BI to manage that risk (Hostmann et al., 2007). Thus, it is important to recognize risk management support as how successfully the organization manages risk as a capability that directly impacts strategic BI use leading to enabling organisation transformation towards becoming data-driven (Imhoff, 2005).

In a nutshell, according to the literature above, it implies through utilizing the right BI capabilities such as high data quality, the right user access, seamless integration with other systems, flexibility and risk management support will lead to successful BI use in organisations which in turn will lead to realising the benefits associated with BI.

2.6 Benefits of BI

Literature indicate that BI provides many benefits to companies utilizing it as it can eliminate a lot of the guesswork within an organization, enhance communication among departments and enable companies to respond quickly to changes in marketing conditions leading to improved overall business processes and performance of the company using it (Gillon et al., 2012; Golfarelli, Rizzi, & Cella, 2004b; Jagielska et al., 2003; Ranjan, 2009). BI benefits can also be categorised into tangible and intangible benefits (Watson & Wixom, 2007). The intangible benefits are such as organisations may eliminate software and hardware licenses and fees by consolidating and retire redundant data marts (Watson & Wixom, 2007). In addition, due to the efficient data delivery, BI leads to time saving benefits for data suppliers and users as well as improved information (Turban et al., 2010). For example, (Anderson, 2015) in support of the view, argue that end users could ask questions like "What has happened?" as they analyse the significance of historical data and overtime organisations evolve to questions like "Why has this happened?" and even "What will happen?". These benefits are easy to measure and are tangible where by it can lead to frizzing of low performing product production or headcount reduction (Davenport, 2012).

The intangible benefits are usually more global in scope and difficult to quantify as business users mature to performing analysis and prediction (Watson & Wixom, 2007). BI can greatly facilitate decision making through reducing decision latency, leading to organisations to gain improvement in business processes and accomplish strategic business objectives (Golfarelli et al., 2004b). Depending on the BI maturity level of the company, BI can facilitate decisions such as entering a new market, launch a new product line or change a company's orientation from product-centric to customer-centric (Wixom & Watson, 2010). Figure 2.2 illustrates the spectrum of BI benefits.

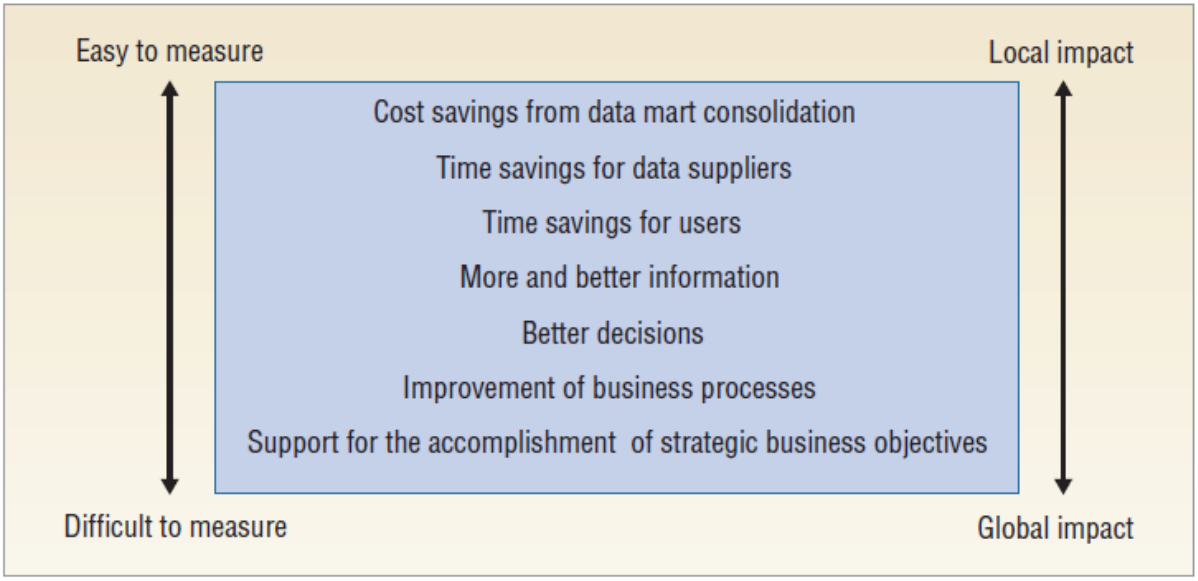


Figure 2.2: Spectrum of BI Benefits (Watson & Wixom, 2007, p. 97)

However, according to Wixom and Watson (2001), for organisations to realise the benefits of BI, it is dependent of its the BI maturity level of which is also related to the organisation's rationale for BI as discusses in section 2.4. For example, Wixom and Watson (2010) argue that

enterprise wise BI use results in to significant, transformation impacts as opposed to localised initiatives aiming at particular departments or units whereby the benefits are only realised locally at the department level. Thus for organisations to fully realise the benefit of BI, the need to gauge it's BI maturity level is paramount (Lahrmann, Marx, Winter, & Wortmann, 2011; Watson & Wixom, 2007).

2.7 BI maturity

The BI maturity models provide good fundamentals for a sustainable and comprehensive development of BI Lahrmann et al. (2011). They help define and categorize the state of organizational capability (Watson, Ariyachandra, & Matyska, 2001) The term maturity is described as a "*state of being complete, perfect or ready*" argues Lahrmann et al. (2011). To get to this desired state of maturity, adds Lahrmann et al. (2011) an evolutionary transformation path from an initial to a target stage needs to be progressed. Maturity Models (MM) are used to guide this transformation process. A high number of Maturity Models for BI have been proposed from both research and practitioners. These include Watson's model (Watson et al., 2001), Teradata's BI and Datawarehouse MM (Miller, Schiller, & Rhone, 2011), Eckerson's model (Eckerson, 2004), Gartner's MM for BI and Project Management (Bill Hostmann, 2009), AMR Research's Business Intelligence/ Performance Management (Hagerty, 2006), Business Information Maturity Model (Williams & Williams, 2007), Model of Analytical Competition (Davenport & Harris, 2007) and Model Business Intelligence Maturity Hierarchy (Deng, 2007).

These models describe a roadmap for organizations to find out where they are in their usage of BI (Lahrmann et al., 2011) and provides a path for progress by which they can benefit from BI initiatives (Davenport & Harris, 2007). For the purpose of this study, the Gatners MM (Bill Hostmann, 2009) forms a starting point in terms of understanding BI use in organisations. The model recognises 5 levels of maturity: unaware, tactical, focused, strategic, and pervasive, through assessments within key areas such as: people, processes, and technology (Bill Hostmann, 2009). This study will not go into detail on the level of maturity but rather the assessment of BI usage using the key dimension: people, processes, and technology make an appropriate tool for later analysis of this study as these are regarded as the major dimension of interest in the generic BI environment as proposed by (Wixom & Watson, 2010).

2.8 Conceptual Framework

The conceptual framework for this research has been created based on the literature review above to guide the research process. According to Miles and Huberman (1984), a conceptual framework provides a guide to researches in investigating a phenomenon by clearly setting out their expectations. Furthermore, Miles and Huberman (1984) argued that a conceptual framework explains, either graphically or in narrative form, the main things to be studied, the key factors, constructs or variables and the presumed relationships between them. From this perspective, the conceptual framework in this study synthesises the determinant factors for BI use to investigate the appropriateness of these factors as CSF for enabling a data driven organisation. This will also assist in the identification of any new factors which have not previously been identified. The overarching framework groups the factors that are identified as important

to answer the research question under three dimensions (contexts): technology, people and processes and organisation context. This is in line with the major dimensions of interest that forms the BI environment as proposed by Wixom and Watson (2001). We will highlight each dimension and its key components below. A summary of the factors under each dimension is presented in Table 2.4 which will form the basis of our empirical investigation presented in Chapters 4 and 5.

2.8.1 Technology

Technology perspective represents the BI capabilities needed to be examined for successful BI use in organisation. As organizations take advantage of these capabilities, their BI use increases, and so does the maturity level of BI (Watson & Wixom, 2007). Mature BI increases organizational analytic capability, which positively affects organisational responsiveness. Thus, in line with a study by IşıK et al. (2013) this study sees BI capabilities as key functions to enable organisations to improve both successful BI use and its adaptation to change to data-driven business processes. However, to keep the research model to a manageable size, we combine the technology and organisational BI capabilities and call them key BI capabilities. The key BI capabilities (see section 2.5) are such as data quality, user access, integration with other systems, flexibility and better risk management support., we include the BI capabilities such as data quality, user access, integration with other systems, flexibility, and risk management support (see section 2.5.1). These factors were included on the basis of their positive correlation with BI use as indicated by IşıK et al. (2013). Furthermore, factors such as data quality, user access and system integration appear as key success factors for BI adoption in several literature on CSF for BI (Joshi & Curtis, 1999; Sammon & Finnegan, 2000; Watson & Wixom, 2007; Wixom & Watson, 2001; Yeoh & Koronios, 2010), adding to the justification for their inclusion.

2.8.2 Organisation context

Organisation context summarises organisation factors that are considered to be relevant for organisations to achieve strategic BI use. The literature review on BI critical success factors reveals organisations factor such as *Management support, Business champion, adequate resources including budgetary and skills* as critical for successful BI adoption (see Table 2.3). Unlike the typical focus on adoption as found in the literature, the study focuses on postadoption stages, that is the actual usage. The study thus focuses beyond dichotomous "adoption versus non-adoption" and accounts for the "missing link" - actual usage - as a critical stage of organisation transformation. Therefore, this study sees the basis in investigating the organisation dimension as one of the critical success factors for BI use. We will theorise the components of organisation dimension below.

Management support has been found to be a common success factor to the success of many kinds of IT implementations and use due to that it can overcome political resistance and encourage participation throughout the organization (Mankoff, 2001; Markus, 1983). Users tend to conform to the expectations of management, and they are more likely to accept a system that they perceive to be backed by the management of their organization (Karahanna, Straub, & Chervany, 1999). This factor is also essential to the success of any Business Intelligence system (Chenoweth et al., 2006; Eckerson, 2004; Sammon & Finnegan, 2000; Wixom & Watson, 2001; Yeoh & Koronios, 2010). Top management support is especially critical when

the BI target is at an enterprise-wide level, in that the key goal of BI is to achieve organisation-wide transformation (Sammon & Finnegan, 2000). A component of top management support is the role of an executive sponsor who is committed to the support of BI use and invests time and effort in showing the way towards doing fact-based decisions (Chenoweth et al., 2006). From this perspective, is in line with a study by Yeoh and Koronios (2010) we argue that successful BI use is likely to be influenced by top management support.

User-oriented change management: Literature indicate that BI implementations have profound effects on organizations as it can modify business processes and change how jobs are performed through shifting data ownership, use, and access patterns (Watson & Haley, 1997; Wixom & Watson, 2001). These changes potentially lead to resistance from its use (Yeoh & Koronios, 2010). Better user participation in the process of change can lead to better communication of their needs, which in turn can help ensure successful introduction of the system Wixom et al. (2011). It is evident that involving throughout the implementation cycle is key for a successful BI use (Yeoh & Koronios, 2010).

Business-centric championship*:* A champion who has excellent business acumen is always important since he/she will be able to foresee the organizational challenges and change course accordingly (Anderson, 2015). As argued earlier, an information system implementation usually causes considerable organizational change that people tend to resist (Markus, 1983). BI implementation in particular has profound effects on organizations as it can modify business processes and change how jobs are performed through shifting data ownership, use, and access patterns (Watson & Haley, 1997). The role of business champions is to strongly support and encourage BI use through exhibiting transformational leadership behaviour and they must possess the skills and zest needed to overcome resistance that may arise within the organization (Howson, 2006). Like management support, champions can help an organisation to achieve success in BI use with organizational issues; however, a champion is likely to have even closer ties to the daily actions and goals of the users (Wixom & Watson, 2001). From this perspective, this study argues that a strong champion presence is associated with organisation success in BI use.

Data-driven decision making: According to Wixom and Watson (2010), a data-driven organisation results when the organisation's ultimate goal is utilizing BI at its highest capacity and as a strategic enabler necessary to enable data-driven decision making. BI plays a major role in their operations and overall business success by enable organisations to conduct their daily organisational decisions based on facts or also termed as "data-driven decisions" (Negash, 2004).

BI and business strategy alignment: Literature indicates that strategic BI use is achieved when Business strategy is aligned with BI strategy (Watson & Wixom, 2007) (Jagielska et al., 2003). When there is alignment, BI can be a powerful enabler of business strategy, including new business models that bring about organizational transformation (Watson & Wixom, 2007).

2.8.3 People and processes

The BI generic environment depicts people and processes as key to ensure that BI meets its organizational goal (Wixom & Watson, 2010). In terms of people, this study looks at factors such as key skills and abilities that are needed to be leveraged to achieve the strategic use of

BI that lead to enabling organisational transformation towards becoming data-driven. Data analysis often involves the customization or creation of tools, the painstaking cleaning of datasets, and the technical and analytic challenges of linking datasets (McAfee, Brynjolfsson, Davenport, Patil, & Barton, 2012). As data become cheaper, some skills required for data analysis are such skills as strong problem-solving skills: strong statistical background, coding skills and domain knowledge, are valuable in enabling data-driven organisation through successful BI use (Yeoh & Koronios, 2010). In addition, for a strategic approach to BI, the need for a broader view of processes is paramount. A strategic view must include processes that makes data and analytics easily available. The data spreading activities are thus crucial to enable a data-driven transformation in organisations: the activities may vary between the use of dashboards, metrics meetings as well as daily stand up meetings borrowed from agile method (Watson & Wixom, 2007).

Table 2.4: A summary of key determinants factors for BI use

Context	Determinants	Reference
Technology	Data quality	(Sukumaran & Sureka, 2006)
	User Access	(Hostmann et al., 2007)
	Integration with other systems	(White, 2005)
	Flexibility	(Gebauer & Schober, 2006)
	Risk management	(Harding, 2003)
Organisation context	Management support	(Sammon & Finnegan, 2000; Watson & Wixom, 2007)
	Data-driven decision making	(Davenport, 2012)
	User oriented change management	(Mukherjee & D'Souza, 2003)
	BI and business strategy alignment	(Watson & Wixom, 2007)
People & Processes	Analytic capability: centralised vs decentralised	(Watson & Wixom, 2007)
	Data management	(Wixom & Watson, 2001)
	Data spreading activities	(Anderson, 2015)
	Business Champion	(Yeoh & Koronios, 2010)
	People skills and abilities	(Sammon & Finnegan, 2000)

3 Methodology

This chapter describes the research method used for this study. It includes research strategy, data collection and data analysis. Lastly, the chapter explains the steps that were taken to ensure research quality and ethics and the limitations of the study.

3.1 Research Strategy

The most popular and commonly used methods in information systems (IS) research are qualitative, quantitative, design science, and mixed methods (Orlikowski & Baroudi, 1991; Recker, 2012). Considering that this study aims at identifying factors that contribute to BI use and how these factors may contribute to organization transformation towards becoming data-driven; therefore, it is essential for the chosen strategy to be able to capture the opinion, perspective and behavior of the people and groups that are experts in BI and tools within organizations.

From this perspective, qualitative methods seemed to fit the purpose of this study. This is due to that qualitative methods intends to explore every context of why people or group of people make decisions and act in the way they do, and later offer the explanation for why that specifically observed phenomenon occurred that way (Bhattacherjee, 2012). On the same view, Recker (2012) argues that qualitative methods are strategies of empirical inquiry that investigate phenomena within a real-life context, and they are helpful especially when the boundaries between phenomena and context are not apparent, or when researchers want to study a particular phenomenon in depth. BI and data driven transformations are phenomena that are still emerging and open to further research explorations. Where a phenomenon is not yet fully understood, not well researched, or still emerging Recker (2012) proposes the use of qualitative methods. This justifies our decisions to conduct a qualitative research due to the nature of our research question (section 1.3). Qualitative methods have distinct advantages in exploratory research because they can possibly uncover complex, multifaceted, or even hidden phenomena and can lead to a more comprehensive, multi-perspective view (Bhattacherjee, 2012; Recker, 2012).

3.2 Data Collection Technique

Interview is the most commonly used data collection techniques in qualitative research method (Recker, 2012). In terms of collecting empirical data in this study, we rely mostly on conducting interviews with experts from BI consultancy companies and companies that are currently deploying BI solutions.

Interviews can be conducted in different methods or forms such as the face-to-face, one-to-many, and telephone/conferencing (Bhattacherjee, 2012; Recker, 2012). We choose to use both face-to-face and telephone methods since both of them have their advantages and we wanted to benefit from both methods. On one hand, face-to-face meetings has more flexibility and provide more control during interviews (Myers & Newman, 2007). The authors add that, face-to-face interviews allows the interviewers to perceive the reactions and body language of

interviewees (Myers & Newman, 2007). On the other hand, a phone interview is more time-saving and can reduce the interviewer effect (Jacobsen, Sandin, & Hellström, 2002). The interviewer effect implies that the physical presence of the interviewer can cause the interviewee to act abnormal (Jacobsen et al., 2002). By also considering interviewees' intention and schedule, we conducted two interviews face-by-face, and four interviews by phone.
The interviews in this research have been conducted in a semi-structured manner, since this method enable us to guide our interviewees to give answers to our proposed questions, but at the same time feel free to add more detailed descriptions of their observations and answers to our questions and let them talk about other things that might be of significance for our research (Kvale, 2006). In that way, we hoped that we might end up with something interesting and that we did not expect when we structured our questionnaire.

3.2.1 Company and Interviewee Selection

We intend to conduct interview on experts that have rich experience on both BI and managing data-driven transformations in organizations. Therefore, we considered the following variables when selecting interviewees:

- ***The company that the interviewee is currently working in***: Experts from both BI consultancy companies, companies that considers themselves to be data-driven and companies that are undergoing data-driven transformations by acquiring BI technologies and tools fitted our study well. On one hand, BI consultants have more overall experience in this field. They work with many different companies and have much information on what roles different factors play in enabling organisation transformation towards becoming data-driven and the challenged and obstacles that companies face in the current era of data-deluge. On the other hand, we also considered views from people inside data-driven companies to get their first-hand experience.
- ***Current responsibilities of interviewee:*** Our intention was to Interview BI experts who are in senior position as we believe that they would have a more holistic perspective and are well informed when it comes to BI and how organisations work in general in relations to Information technology transformations such as enabling data-driven.
- ***Length of interviewee experience in the field of BI***: We considered this variable as beneficial since it signifies richness in knowledge tested over time. Also, it is not necessary that the experience is from the current company since different position enables one to have a more comprehensive view.
- ***Diversity of perspectives***. We intended to find respondents that are active in different industries. In our case, BI consultants seemed to fit the purpose as they tend to work within different industries in helping them with data-driven transformations hence facing different obstacles.

Based on the above criteria, we began our search for contacts mainly through google by typing "data-driven organisations" which mainly brought results with consulting companies that aim to help organisations to undergo data-driven transformations. Furthermore, we came across different companies that were considered data-driven through business cases that were presented by consulting companies such as SAS, IBM, ACANDO and Accenture. We then looked for the BI experts' contacts through company websites as well as professional social media such as LinkedIn. We wrote emails to the potential candidates describing our research purpose and our intent for interviewing and followed up with a phone call directly to the company. We received responses with an interest in participating the interview however, due to

one reason or another, most of them failed to arrange a meeting with us. Finally, we able to carry out interview with six experts, and the detailed information is provided in Table 2.1. Furthermore, a description of the companies that each of our interviewee is working in, as well as the experiences and current responsibilities of each interviewee is provided.

Table 3.1: Information on interviewees

Respondent Code	Name	Position	Experience	Company/Industry	Date and Duration	Method
Rsp1	Johan Rastenberger	Head of the AI and Advanced Analytics Business Area	21 years	Enfo Group	15/05/2018 62 minutes	Face-to-face
Rsp2	Isabelle Athle	Data Science	3 years	Acando	16/05/2018 59 minutes	Phone call
Rsp3	Peter Ryman	CEO	20 years	HoneyBI	14/05/2018 42 minutes	Phone call
Rsp4	Justhy Deva Prasad	Founder and chief data partner	20 years	Claritysquare Technology, The Data Strategy Lab	18/05/2018 76 minutes	Face-to-face
Rsp5	Johnny Nilsson	Sales director	3+ years	CGI	25/05/2018 60 minutes	Phone call
Rsp6	Tobias Sjölin	Project Director	8 years	Boozt fasion AB	26/04/2018 33 minutes	Phone call

Tobias Sjölin

Tobias Sjölin is the Project Director of Boozt fasion AB (referring to as Boozt hereinafter). Boozt is a leading, fast-growing and profitable Nordic technology company selling fashion and beauty online (Boozt, 2017). Headquartered in Malmö, Sweden, the Boozt family is made up of 30 nationalities, 14 departments, and more than 200 people (Boozt, 2017). Boozt is built with the power of understanding the underlying data behind every part of the operation (Boozt, 2017). As an online company, Boozt has been using data and analytics since it started operating. Initially the company used Google analytics and later on when it became bigger it started investing in using different BI tools such as Pentaho since 2013. After a year, they added Qlik as one of their key tools for visualisation. Tobias Sjölin is currently the Project Director and is responsible for the project management and business development of all systems at Boozt. He has eight years of experience in Boozt, and before that, he worked as development manager in another IT company for a little over six years. We believe that his current position as well as previous experience enables him to understand the role of BI in enabling data-driven organisations.

Peter Ryman

Peter Ryman is the CEO of HoneyBI. HoneyBI is a consultancy company focusing on BI and help organizations and support them in their BI journey and integrating different systems to combine their data in the structure way (HoneyBI, 2018). It was founded in 2018, and has customers in different industries, from governments, hospitals, to supply chain companies, and consultant companies (HoneyBI, 2018). Before being the CEO of HoneyBI, Peter Ryman has four years of experience as the head of group business control and 16 years of experience in the finance sector. This also enables him to possess extensive experience in business processes and BI from both client side as well as agency side.

Johan Rastenberger

Johan Rastenberger is the head of the AI and Advanced Analytics Business Area (AAABA) in Enfo. Enfo is a Nordic IT service company offering business solutions and managed IT services. It is established in 1964, and it comprises approximately 900 niched experts partnering for success in the digital dimension (Enfo, 2018). The AAABA focuses on the next generation of Analytics offerings. Johan Rastenberger has quite long experience with BI. He has been worked with BI since 2004 with different positions like manager or consultant. Before that, he also has seven years of experience as IT consultant and IT manager. He started to work in Enfo since 2017, first as the senior consultant in the data & Analytics department, then leader of the analytics team, and after that head of the AAABA.

Isabelle Athle

Isabelle Athle is a consultant within Analytics - Data Science from Acando. Acando is a software, information technology, database and web design consulting firm based in Stockholm Sweden. It was founded in 1999 and currently has approximately 1,900 employees in four countries in Europe and a delivery center in Latvia (Acando annual report, 2017). Acando is the only Swedish company with a sufficiently broad skills base and size in business systems, management and digital solutions to be able to successfully compete with the major international companies in complex project implementations (Acando annual report, 2017). Isabelle Athle has

been working in Acando for three years. Consulting within Analytics and Data Science provided her with both Technical and Business perspective. She acts on all phases within data management with the ability to evolve knowledge, insights and actionable results from structured and unstructured data.

Justhy Deva Prasad

Justhy Deva Prasad is the founder of the Data Strategy Lab and is also the founder and chief data partner of Claritysquare Technology. The Data Strategy Lab and Claritysquare Technology are consulting organizations that researches, explores and discovers how 'Good' and 'Great' companies become 'Digitally Great' companies and help them in this transformation (Data Strategy Lab, 2018). Justhy Deva Prasad is also a consultant that has served global clients on behalf of IBM Labs, Dublin, Ireland for over 15 years. When we first met him he was working as a consultant in IKEA. Besides that, he is also the author of The Billion Dollar Byte-Turn Big Data into Good Profits, a book that aims to help companies unlock value from their existing data.

Johnny Nilsson

Johnny Nilsson is the sales director in CGI Sweden AB. CGI is a Canadian global IT consulting, system integration, outsourcing, and solutions company founded in 1976 (CGI, 2014). It currently has 72,500 employees and have customers in hundreds of locations worldwide (CGI, 2014). Johnny Nilsson has more than 20 years of experience in the IT industry, and for the previous 4 years he works closely with business analytics.

3.2.2 Interview design guide

When data collection for research is made through interviews, it is crucial to create an interview guide so as to manage the process well (Bhattacherjee, 2012). We created an interview guide (Appendix 1) based on the research framework (table 2.4). That is, we divided the main part of our interview guide into three sections: Technology, Organization context, People & Processes. Each section consists of questions formulated according to corresponding factors. According to Rabionet (2011) the important part when creating interview questions is that the questions should aim at answering the research question and are based on a good grasp of the subject matter (Kvale, 1996, 2006; Myers & Newman, 2007) To answer our research questions, we designed our interview questions for each factor based on the following two concerns:

- Whether the identified factor is considered by the respondent as an important factor that contribute to BI use?
- How the identified factor should be leveraged to better contribute to organization transformation towards becoming data-driven?

To start with, we have more general questions concerning the respondents understanding and view over data-driven organizations and the role of BI in transforming towards data-driven. This makes the interviewees more comfortable with the discussion (Myers & Newman, 2007). Moreover, by asking broad questions without a certain context, it is possible to see which factors the interviewees consider to be important related to BI use. We also chose to include questions regarding company background and the interviewees' background. The purpose of our background questions is to get a clearer image of the interviewee and achieve an understanding of how the company works with BI. In the last section, we have a summary question regarding

the key and most important considerations as perceived by the respondent in BI use and a clarification of any items we may have missed in our framework.

In order to get a deeper picture of the considerations, we not only used 'Yes' or 'No' questions but also included open ended questions in each section that allows the interviewees to personally reflect on the subject meanwhile letting the interviewer dig deeper into specific details (Bhattacherjee, 2012; Kvale, 2006; Recker, 2012). Moreover, although different companies have different background in BI use, we decided to use the same questions to all interviewees, as our interview questions were mainly geared towards generic concepts and factors as seen in our literature review and we believe they were understandable to all interviewees.

3.2.3 Conducting the Interviews

Both of the two researchers participated in all the interviews. Before each interview, we discussed together to better prepare ourselves for the interview. We read relevant information about the interviewee and the company from website and changed our interview guide a bit accordingly to better fit the interviewee. After that, we sent the interview guide to the interviewee in advance in order to give them some time for preparation and help them to understand our questions more quickly during the interview. We also discussed how we should collaborate during the interview and set all the devices (such as phones and recording software) properly to ensure the interview can proceed successfully. We aimed to conduct interviews of high quality with the purpose of getting as much relevant information for our research topic as possible. Hence we divided our interviews into three main stages: entry, discussion, and closure, as proposed by Myers and Newman (2007)

In the entry stage, we first introduced ourselves and expressed our appreciation for them to take our interview. Then we presented the purpose and objective of our study, our research question, as well as the confidentiality issue. After that, we asked them whether they mind their and/or their company's name to be appeared in our paper as well as whether they are okay with the interview being recorded. The purpose of recording the interview is to have a chance to listen and analyze the interview again after its completion. All of our respondent consented for being recorded during the interview and their names and company names to appear in our paper. Afterward, we asked them to provide some general information about themselves as well as the company, position within the company, working experience, etc.

During the discussion stage, we depended on the interview guide (Appendix 1) to discuss the research topic with the interviewee. We tried to make it more like a discussion rather than just asking questions one by one. As we were using semi-structured interviews, we had chance to follow up, comment, and ask extra questions. Furthermore, we gave the interviewee the freedom to comment and continue his answers without interrupting.

In the closure stage of the interview, we asked the interviewee if there is anything that is important, but we had not mentioned and asked for their comments, and finally, we thanked the interviewee for the participation and asked for comments.

After each interview, we reviewed our questions and revise them if anything is found to be unclear or missing during the interview.

3.3 Data Analysis

Data analysis and collection can be highly interwoven or even dependent on each other in qualitative research (Miles & Huberman, 1984). Considering this, we first ran a pre-interview with one of the companies. Based on the result, we optimized our questionnaire to ensure that our questions are clear, well-organized, and covers all the factors we concern. In addition, during analyzing, we were open with the possibility to follow-up with the interviews or other sources of data to further explore one concept or to explore its associations with other constructs and so forth.

To analyze interview data, the first step is to prepare data, that is, to transcribe interviews. To improve the efficiency and ensure the quality of transcripts, we used the online tool Xunfei to generate draft transcripts, and then correct them manually. The transcripts were then cross checked for completeness and correctness by the other author. Flick (2013) suggests that it would be helpful to include utterances in initial transcriptions, which may have important implications for how talk is understood. Therefore, we included pauses and laughter in transcriptions, and during face-to-face interviews, we also took additional notes on their body language and our personal impressions. In addition, we executed the transcription directly after the interview so that we can note down important discoveries when our memories were still fresh.

After transcriptions are finished, we used the software NVivo as an assist tool in the coding process. In order to derive patterns in the data and identify key items of significance to answer our research question, analysis was done based on the grounded theory approach developed by Glaser and Strauss (1971) which includes open coding, axial coding and selective coding as outlined below:

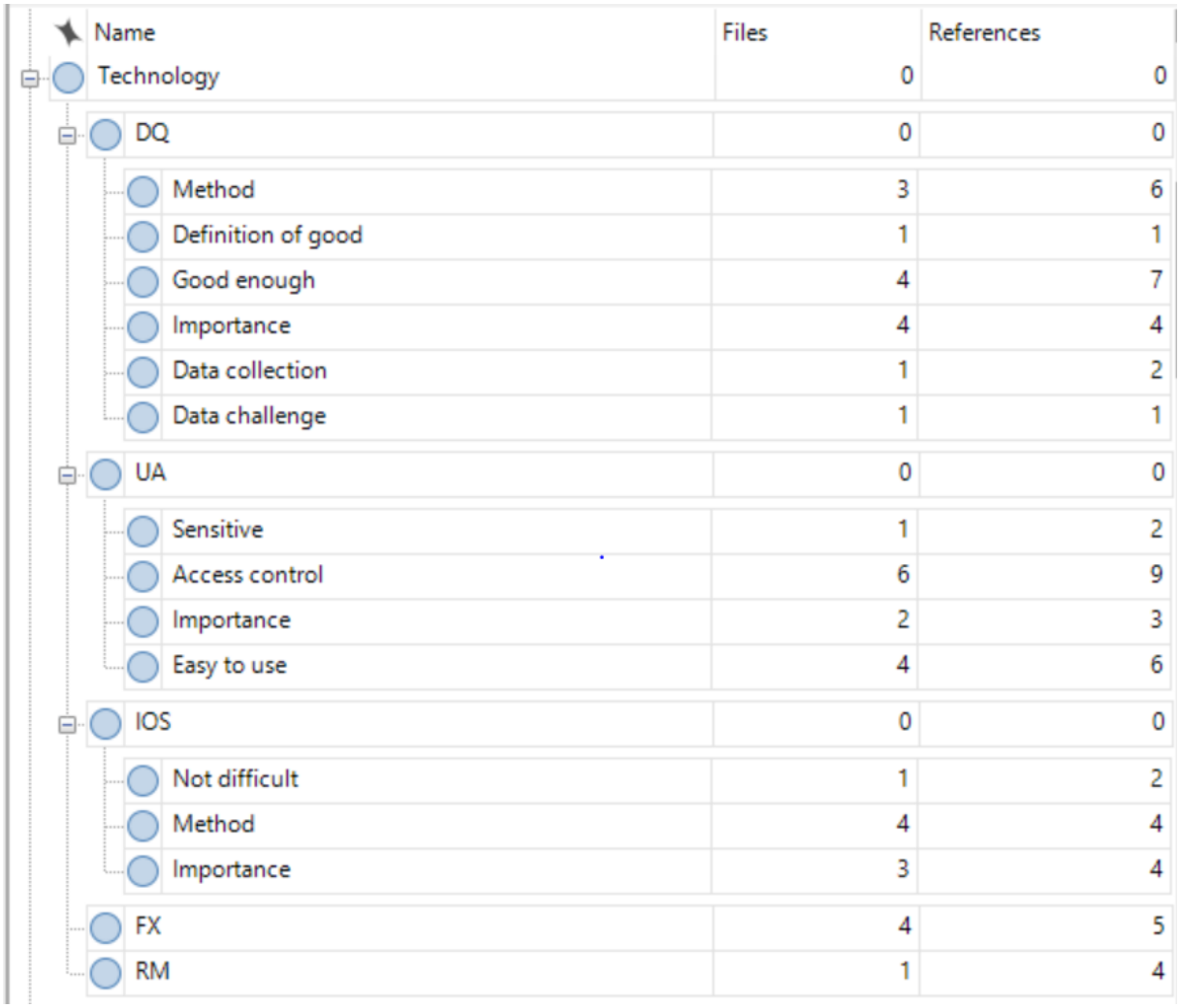
Open coding and selective coding: We ran open coding to identify concepts or key ideas that are hidden within textual data (Bhattacherjee, 2012). In this stage, we firstly formed the basic codes based on our research framework, as shown in Table 3.2, and then translated them in into NVivo nodes as seen in Figure 3.1. Then, we went through all the transcripts and thoroughly attached codes to different parts of the text. This ensures that all contents from the transcripts are moved into NVivo for later validation, and related texts are categorized under the corresponding coding units.

Table 3.2: Base nodes

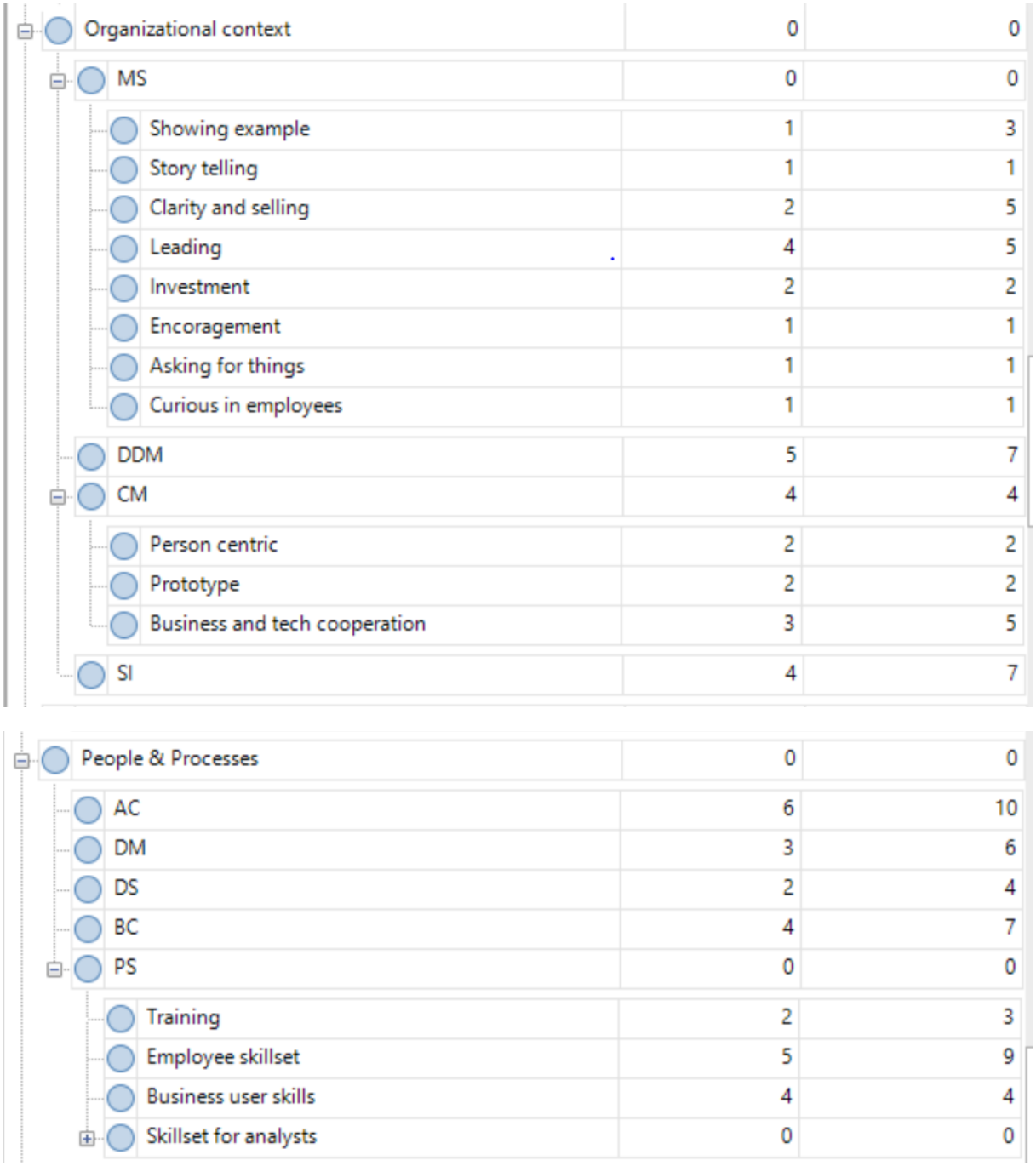
Technology	**Organization context**	**People & Processes**
DQ: Data quality **UA**: User access **IOS**: Integration with other systems **FX**: Flexibility **RM**: Risk management	**MS**: Management support **DDM**: Data-driven decision making **CM**: User oriented change management **SI**: BI and business strategy alignment	**AC:** Analytic capability **DM**: Data management **DS**: Data spreading activities **BC**: Business champion **PS**: People skills and abilities

After that, we read through contents under each base note, and grouped similar concepts into subcategories and then subcategories into higher order categories. An example from **Figure 3.1** below is in the people skillset node, we categorized contents into skillset for data analysts, skillset for business users, and common skillset for all employees. Under the category of skillset for data analysts, we further divided contents into subcategories indicating different opinions from respondents.

Axial coding: In this stage, categories and subcategories are assembled into causal relationships or hypotheses that can tentatively explain the phenomenon of interest (Bhattacherjee, 2012). After this, all contents were logically combined and categories to establish final key factors.



Name	Files	References
Technology	0	0
DQ	0	0
Method	3	6
Definition of good	1	1
Good enough	4	7
Importance	4	4
Data collection	1	2
Data challenge	1	1
UA	0	0
Sensitive	1	2
Access control	6	9
Importance	2	3
Easy to use	4	6
IOS	0	0
Not difficult	1	2
Method	4	4
Importance	3	4
FX	4	5
RM	1	4



Organizational context	0	0
MS	0	0
Showing example	1	3
Story telling	1	1
Clarity and selling	2	5
Leading	4	5
Investment	2	2
Encoragement	1	1
Asking for things	1	1
Curious in employees	1	1
DDM	5	7
CM	4	4
Person centric	2	2
Prototype	2	2
Business and tech cooperation	3	5
SI	4	7
People & Processes	0	0
AC	6	10
DM	3	6
DS	2	4
BC	4	7
PS	0	0
Training	2	3
Employee skillset	5	9
Business user skills	4	4
Skillset for analysts	0	0

Figure 3.1: Snapshot of coding summary from NVivo

3.4 Quality and Ethics

According to Bhattacherjee (2012), in order to ensure the quality of our study, validity and reliability are the "psychometric properties" of measurement scale that need to be taken into consideration. In addition, we will consider the ethics that are also important for achieving better research quality (Bhattacherjee, 2012; Brinkmann & Kvale, 2005).

3.4.1 Validity

Validity in qualitative research refers to the adequacy and appropriateness of the tools, processes, and data used and collected in the research (Recker, 2012). (Bell and Bryman (2007),

discuss validity in qualitative methods from two perspectives; internal and external validity. The internal validity involves the degree of correspondence between the researchers' observations and the theories and terms they use. The external validity involves the results' generalizability.

To ensure internal validity, we carried out our research, from interview guides, framework construction, to interpreting the answers, based on literature review and theories. In addition, since we are doing interpretive social science research that according to Bhattacherjee (2012) interprets the social reality through the subjective participant viewpoints, we will provide a detailed description of our empirical results, with the aim to prove the validity of our research. This is in line with literature that the researcher must provide detailed descriptions that are rich with information about the research and its findings so that the readers can decide to what extent the findings are transferable to other settings (Bhattacherjee, 2012 & Recker, 2012)

The external validity, as Bell aand Bryman (2007) discuss, is an issue for the qualitative approach due to its focus on specific contexts and limited research objects. In our research, we focus on industry-neutral parameters and we interviewed six experts to improve the generalizability.

3.4.2 Reliability

We considered the following suggestions provided by Bhattacherjee (2012) on how to create reliable measures:

- Replacing data collection techniques that depends more on researcher subjectivity (such as observations) with those that are less dependent on subjectivity (such as interview). I our study, we used interviews as the main method for data collection.
- Asking only those questions that respondents may know the answer to or issues that they care about. That is why we choose to interview people in senior position.
- Avoiding ambiguous items in your measures (e.g., by clearly stating whether we are looking for data analyst requirements or business user requirements).
- Simplifying the wording in your indicators so that they are not misinterpreted by some respondents (e.g., by avoiding difficult words whose meanings they may not know).

In addition, in our research we have provided the detailed descriptions for all parts of our thesis. We tried to make our research process "trustable" by describing in detail all phases we went through, starting from defining our work in the literature review part, defining what research method we have chosen to conduct our study on, how we collected our data, how we selected our informants, how we did the data analysis, what have we done to ensure the quality of the research, reporting of the empirical findings, and providing the full questionnaire as well as the transcripts of all our conducted interviews in Appendix. Hence, by providing all these details about our research our aim is to increase the trustworthiness of it, as suggested by Golafshani (2003). Moreover, we believe that by providing all of the details mentioned earlier, readers can get a chance to critically evaluate our work.

3.4.3 Ethics

We considered the following ethical principles provided by Bhattacherjee (2012) when conducting our research:

- **Voluntary participation and harmlessness:** After identifying potential interviewees, we contacted them via emails and politely asked them if they are interested in participating in our research after briefly explaining the research. We continued to contact them only after receiving a positive feedback and ensure that they can withdraw the research at any condition.
- **Anonymity and confidentiality:** As we mentioned previously, at the beginning of interviews, we informed our interviewee that they will have the option to choose whether they want their and/or their company's name to be kept anonymous for our study. Also, before the interview, we asked them if they mind that we record our conversations.
- **Disclosure:** When contacting with potential interviewees, we clearly introduced ourselves and briefly explained the research. After receiving a positive feedback, we sent them the interview guide so that they can get a glimpse of the topics that are going to be discussed. In addition, we reassured the interviewee at the start of the interview about our purpose and about confidentiality.
- **Analysis and reporting:** we reported exactly how data is collected and analysed, and unexpected or negative findings are also fully disclosed.

3.5 Limitations

This study suffers from some limitations. Firstly, generalization is not justified because the findings are based only on 6 interviews conducted in Sweden. Secondly, this research was conducted in randomly selected subject experts in the area of BI who works in organizations that were considered to be data-driven or helping organisations transformation towards becoming data-driven. A different outcome would be obtained for purposefully selected highly matured data-driven organisation. Thirdly, the research was based on qualitative interviews. Using a case or longitudinal study might be recommended for further research to gain a deeper understanding of topic.

4 Findings and analysis

This chapter presents the analysis of findings obtained in accordance to the methodology applied in chapter 3 above. The structure of this section follows that of our research framework. Direct quotations from the transcripts are cited by the following notation: Rsp3:48 refers to Respondent 3, Section 48.

4.1 Technology

Respondents have talked about the importance of the factors, challenges organizations may meet regarding each factor, and suggestions on how to better leverage the factors. Data quality, user access, integration with other systems are regarded by most of the respondents as key technological factors for a successful BI project. Flexibility and risk management are also seen as important functions that BI tools should incorporate.

4.1.1 Data quality

Data quality is viewed as a critical factor for a data-driven organization by both Rsp3 (48) and Rsp5 (22). People need to have data quality for taking right decisions, and if the data quality is poor, then people and users will not rely on the data (Rsp3:48). Meanwhile, as Rsp2 (54) and Rsp6 (80) state, it is a big challenge that companies face in enabling data-drivenness. Most companies are questioning whether or not did they have that data quality that is good enough for them to base decisions on it (Rsp2:54).

"Challenge is to have most data. That is what I believe most companies are questioning, whether or not did they have that data quality, good quality enough for them to base decisions on it."

- Rsp2 (54)

As understood by Rsp3 (50), high quality data should be correct, up to date, and validated. However, Rsp1 (58) and Rsp2 (56) discuss that people should not expect to have perfectly clean data within big organizations today. On one hand, the technology has not come that far yet, there are always data quality issues (Rsp1:58; Rsp2:56); on the other hand, data quality can be considered as good enough if it supports what it's been used for. And that also means that it can change quality. It can be good quality for certain purposes, but low quality for other purposes (Rsp1:68).

"The best is the enemy of the good...there are always data quality issues...And it's not a one time off, that you go in and clean them, then it's clean. No, it's a continuous process. What I meant by the best being the enemy of the good is that, you need good enough quality. You don't need the best quality for a decision... At some point, you need high data quality for certain things. But you should be aware that it always hit you because that things you can't do because you have such poor data quality. But you have to begin somewhere and beginning somewhere is by actually working with business intelligence or whatever it is."

- Rsp1 (58)

Rsp2 (56) also claims that data quality is a continuous work. An easy step that organizations can take to improve their data quality is to put more effort on the data source (Rsp2:56). Rsp1 (60) has a similar suggestion that people who enter data into the system should get something back, otherwise they will not care about data entering. Rsp1 (60) states that usually today organizations have data quality issues because people in the low level enters data, but only management cares much for high data quality. So, involving the whole company in thinking in data-driven way will also contribute to better data quality (Rsp1:60). From the technical perspective, Rsp3 (30) suggests that to have good data quality, an organization needs quite a strong database. In the first it needs to have a data warehouse structure where to consolidate data, and ETL processes where to extract and load the data into the data warehouse. Moreover, Rsp2 (84) suggests that it's important that users at all levels understand their actions when it comes to data-collection process.

"if you want to be data-driven organization in all your decision levels, then even the lowest level of this, those people that are entering things in the system, they will also have a reason to think of data, and data decision, and data quality, because they are taking decisions upon it. Usually today when we have these data quality issues because somebody very low in the organization enters data, and the only other one who is crying for high data quality is management. And there's quite many steps between there, and nothing happens, or maybe something happens once, and then they forget it or whatever. So, involving the whole company in thinking in data-driven way will also contribute to better data quality. It comes like a nice side effect. But that's always an issue, always."

- Rsp1 (60)

4.1.2 User Access

Both Rsp1 (36) and Rsp4 (64) emphasize that user access is very important. A company benefits best when they can get their data-driven decisions trickle down to many small decisions, and to get these small decisions data driven and make the technology support these individuals that are not thinking data, accessibility would be a very important feature (Rsp4:64). Rsp6 (104) also mentioned that in his company, they try to give people more power to get an access to think or to keep an eye on the sites and all the KPIs.
Almost all the interviewees mentione that user access has to be allocated based on user roles and business process (Rsp1:38; Rsp2:86; Rsp3:46; Rsp4:65). As Rsp1 (38) states, people should be given access according to their needs. People shouldn't have access to somethings they don't need that. But it's also important that people actually do have access to everything that they need, so that they're not limited.

Furthermore, there is also one thing that should be payed attention to, sensitivity. Because person centric data is the most important as well as the most sensitive, and must be taken good care of, adds Rsp4 (61).

"Depending on the relevance, depending on the process...So user access has to be allocated according. So that's based on the business process, the relevance of the business process. And the involved actors. So, you only need to see the data that's relevant to you to make your decisions...So you need to decide relevant data to be available based on the need basis."

- Rsp4 (65)

4.1.3 Integration with Other Systems

Most respondents state that integration with other systems is one of the key factors for a successful BI project (Rsp3:34, Rsp 4:57, Rsp5:44) since it enables people to get the whole truth, and the BI system would become useless if it is not integrated with other systems (Rsp4:57). In the case of Rsp6, his company has around 17 different systems and they push all the data into data warehouse, and then Qlik is using that to show dashboards (Rsp6:50). Regarding the method, Rsp3 (34) states that it depends on the business and what the decision makers really need to see and act on, and Rsp1 (46) expresses his opinion that integration should be of two kinds: importing and extracting data. The integration of importing data should be atomized while the integration in data output should be considered based on the requirement. However, this is not a pain point for most of the organizations currently, as Rsp2 (34) states, there is a solution for this in most of cases.

"We're talking about two kinds of integration. One of them is the integration of importing data, that would have to be automated. But then you have an integration I talked about where you can actually integrate it into other systems like Qlik for visualization… I think that is quite important to have an idea about how to do… it will always be a blockage if you have to go somewhere else."

- Rsp1 (46)

"I think integration with other system works fine. I have not yet seeing that to become a problem within an organization…of course, not everyone will integrate well with everything. But as far as I know, there is a solution for most of the things."

- Rsp2 (34)

4.1.4 Flexibility

BI should be flexible enough to handle the business process (Rsp5:46). This is confirmed by Rsp2 (42) by explaining that flexibility is necessary because everything changes, and to be a data-driven organization, that means change can happen all the time when you gain new insights. Rsp5 (46) further explains that the business should never be limited by a system. Rsp4 (78) extends this by using another concept "resilient". He claims that with the BI system, it always has to be resilient. Flexibility is a given, but resilient is more important in the sense that its ability to sustain change.

"So flexibility, yes, I would say flexibility is necessary and even for the kind of lower usage, it's needed because everything changes. And to be a data-driven organization, that means change can happen all the time, when you gain new insights. And if you don't have flexibility at all with in your tool, that would be a quite struggling change to make when you need to make it."

- Rsp2 (42)

4.1.5 Risk management

In the opinion of Rsp1 (76), although it would be hard for the BI system to support management because sometimes changes are not predictable, today most tools today would support it, and it is much about configuring it and how users use it.

"It's so much about configuring it and how you use it. Much more than a tool itself, I would say. I would recommend everybody to work with scenarios. And it's always nice when you have a tool that can support scenarios. It can be simulations. It can be what happens if things happen...so I think most tools today would support it, it would be strange if they wouldn't support that kind of risk management. It's more the implementation...Maybe the thing is that is it easy for you to import new data sources? But that's again more of an architectural thinking. Are you taking consideration that you might need in a very short notice a new source of data? Can you handle that? Yeah, all systems support that, depending on how you configure them."

- Rsp1 (76; 78; 80)

4.2 Organisation context

As respondents emphasized, the idea of being data-driven has to trickle down in an organization from the top level, and data strategy should be based on the business strategy. During the transformation, it is important that people from different units engage in the whole process and contribute to the requirements. To encourage data-driven decision making, it is essential to support the end users by reports or dashboards that really helps.

4.2.1 Management Support

Management support is suggested by and Rsp1 (14), Rsp3 (72), and Rsp5 (88) as a very key factor in enabling data-driven. They agree that the idea must trickle down in an organization from the top level. If the top level is not data-driven, nothing else will be (Rsp1:14). First, the management needs to find the tools which are best for the organization, and they need to make quite expensive check in, and pre-project for actually deciding which is the most cost-efficient tool (Rsp3:74). As Rsp4 (127) states, the management needs to invest in people and Datapreneurship as a competence.

"I mean the management, has to be the sponsor. You have to have management as a sponsor."

- Rsp5 (88)

During the whole process, the management team needs to lead by good examples, showing usage from the top down perspective down in the organization (Rsp3:82). It is important that they have a capability of storytelling, both in why people are here, what is the purpose of the company, but also storytelling about good things, things that promote the culture they want to achieve (Rsp1:105; Rsp1:56). Rsp2 (70) expresses the similar opinion that the support of clarity from the management is not to be underestimated. In this way, the organization will be more open, and people can interact and share issues that happens within different parts of the organization.

"You want to go quickly. You want to go fast. Well, then you have to fire everybody, because people change slowly. You have to sell, sell the idea to them. Why should we do this, what is the purpose of this? And the selling part is very expensive and takes a lot of effort. So that is absolutely crucial for success."

- *Rsp1 (56)*

In addition to that, Rsp1 mentions another two important factors for the management support, being interested in employees and encourage them to fail and learn from it, as well as to always ask questions never answered before. They must encourage employees to be curious and interested in asking for the information that the decision is based upon (Rsp1:95).

"But this is the way to go, encouragement. And having these processes there, for the governance part, how to handle all these new ideas that comes in, how to qualify them, quality assurance them, and all these things, have thought about these processes in some way. Just get out there and do it, and don't be afraid."

- Rsp1 (97)

4.2.2 Data-driven decision making

Rsp2 (76), Rsp4 (124), and Rsp5 (74) define data-driven decision making as basing decisions on facts instead of intuition. To be specific, people don't take decisions from what they think or what they believe, but base on the data that they have. Rsp3 (80) extends the definition to the use of quality figures within the whole organization and different areas. However, Rsp2 (76) also raises the importance of not to delete the intuition part and suggests that people should combine intuition with fact-based decision making. She further explains that because people have been working in the corresponding area for a long time, and if they don't have any data to start with, then intuition can start and they can test if the intuition is right (Rsp2:76).

To encourage data-driven decision making within an organization, Rsp3 (78) claims that it is essential to support the end users by good reports, dashboards, or other things that helps them in their daily business. Furthermore, in the beginning of the BI project, it is important to build examples where BI makes manual work digital and data-driven. Rsp1 (101) provides another suggestion, to match people with similar job functions so they find encouragement in each other.

"If you make business intelligence solutions and support the end users by really good reports, dashboards, or other things that helps you in your daily business, then you will become data driven. So you need to show the good examples, and in the beginning of the BI project, build examples where you make manual work digital and data-driven."

- *Rsp3 (78)*

4.2.3 User oriented change management

Most respondents (Rsp3:69; Rsp4:11; Rsp5:66; Rsp6:68) agree that it is important that people from different units engage in the whole process and contribute to add to the changes that BI

systems may bring. Rsp5 (66) explains that it is needed because the process should not be only taken from the top, they don't know the business, and they don't understand how people in different units are doing things. Rsp3 (69) extends this by suggesting that the best way is to do a proof of concept, a small prototype within a small area and that project should involve end users to get their opinion on what is needed for taking better decisions. This is also confirmed by Rsp6 (68) as he gives the example of how the IT department in their company uses the iterating developing method to involve business people in BI programmes.

"the BI system needs to be person centric. So that means whoever is in the processes, in the involved process needs to contribute to the requirements."

- Rsp4 (111)

4.2.4 BI and business strategy alignment

It is commonly agreed that data strategy should be based on the business strategy (Rsp2:78; Rsp5:102). Rsp3 (20) explains that if the BI team does not have a clear opinion on how to calculate some of KPIs or how the business models really act, then it's quite difficult to work in a data-driven way within an organization. He also emphasizes that a very successful factor is that different parts of the company interacts with each other (Rsp3:24). This is also confirmed in the example provided by Rsp6 (110) that in his company different departments sit together and look at the overall strategy to make decisions. Rsp4 (86) provides the similar suggestion on how the BI team ensure that the BI strategy aligns with the business strategy. Having clear targets and having a good understanding of the business models and business objectives would be the essential. Rsp2 (78) extends this by providing a more detailed operation suggestion, to work with hypothesis. That means to create hypothesis depending on the business strategy, and then use the hypothesis to build the analytical strategy.

"And from history perspective, the IT department has been sort for collecting information, supporting the system and applications within the company. But there is a change for more interacting with market, with finance, with ongoing operations. And I think a very successful factor is that those different parts of the company interacts with each other."

- Rsp3 (24)

4.3 People and Processes

Respondents express their opinion over data and data analytic teams. Regarding data, most respondents suggests that data be centralized and data spreading activities be implemented without the missing of the storytelling part from management. Regarding data analytic teams, hybrid of centralized and decentralized modes for different types of analysis is suggested by most respondent, and most respondent agree that besides the technical skills, understanding of the business is very important for data analysts. However, a respondent also emphasizes that it will not be easy to find that person.

4.3.1 Analytic capability: centralised vs decentralised

It has been noted that there are pros and cons on both structures, and respondents have different opinions. Rsp6 (44) suggests that the analytic team be distributed in different teams so that the analyst will be more close to the business and hence makes the analyst more approachable. He also gives an example that in their company they have one analytic person in each business unit. However, Rsp5 (56) states that to have good analytics it should be centralised, and they can use the knowledge in different areas in the company. He further explains that it is good but not realistic to have a good analyst in every unit, so it's better to have one good centralized unit who have developed the skills rather than a wide distribution of skills across the organisation which may result into lack of focus (Rsp5:58). This opinion is partly confirmed by Rsp3 (62), who claims that within some very large corporations, the decentralised structure could work as they have the capacity and the resources for it. In small and medium sized corporations, they should be centralized to be efficient and, in some way, it leads to cost savings as well.

"Because I don't think it's realistic to think that you have a good analyst in every unit. So sometimes it's better to have one good centralized who are have developed the skills for the companies needs and capabilities rather than small units and less skilled. Ok, maybe it's the equal skill in every unit is very good, but I don't think it's realistic to think that way."

- Rsp5 (58)

Hybrid is suggested by most of respondents (Rsp4:101; Rsp2:64; Rsp1:82). In ideal conditions, an organization will need both centralized and decentralized analytic capability for different types of analysis (Rsp2:64). The core functionality will deal with critical and crucial things (Rsp1:82) and give the standard guidelines (Rsp4:101). They will provide the organisation with the governance, frameworks with executions happening at the local level (Rsp4:101). While analytics that are close to the organizations can learn more about what is happening, thus shortening decision making time and decreases misunderstandings (Rsp1:82).

"I think some things you might need centralized, very specific competences that can be shared across the company. It could be data scientists or people working with those specific things. You would also need a centralized function for the core functionality where you actually have some critical, crucial things that has to be done and reported on...you would need that to be centralized...but you cannot only do that, you need decentralized analytics capabilities...because of things changes a lot, and centrally, you don't know what happened. And I think the analytical capabilities needs to be close to the decision makers. It shortens the time, it makes misunderstandings less more so."

- Rsp1 (82)

4.3.2 Data management

It is agreed by most of the respondents (Rsp3:44; Rsp5:38; Rsp6:50) that data should be centralized. Rsp5 (38) explains that securing data in a big data warehouse enables organizations to be free in their tools and on their front end. Rsp6 (50) also gives the example that in their company, they have 17 different systems and the data is centralised into data warehouse. Users can then access the data through appropriate user access.

"It should be centralized. It should be under the control of some kind of centralized department that can take the full responsibility for the data. And I think that a lot of GDPR and a lot of legislation right now, is going that direction right now, need to be controlled and managed in a better way, perhaps than it was done in the past."

- Rsp3 (44)

4.3.3 Data spreading activities

Rsp6 (59; 66) gives example of two data spreading activities used in his company. The first activity is that they have physical screens all over the office, showing specific dashboards for each team. The second activity is that emails on sales and performance are sent out every morning to key decision makers. However, Rsp1 (109) underlines that from a management perspective, the activities themselves are not so important. He explains that the activities will not take full effect if the storytelling part from the management is missing. This also adhere to what mentioned in the management support factor.

"But I don't necessarily think that, just showing graphs and charts on one chart. From a management perspective that doesn't really feel important for you. As an employee, you get, oh my god, the manager trying again, showing these boring numbers to us. We don't care. That's where we need the storytelling. That's what I need to and support the storytelling by having the monitoring there, or whatever."

- Rsp1 (109)

4.3.4 Business Champion

Showing good examples is the point of the success factors in the company to get people engaged (Rsp5:90). Here also involves two kinds of championship. The first type comes from the management. Rsp6 (70) gives the example of its companies COO, who is always advocating data-driven in everything they do, which makes other people more engaged. This also adheres to the leadership support from the management we mentioned in the preceding factor. The second type refers to the championship in each business unit. Most of respondents (Rsp1:105; Rsp3:82; Rsp5:72) agree that it is important to have a champion in every unit, to find good ambassadors to show what people can do. It is easier for end users to talk in their language other than only from the project perspective. Rsp1 (105) extends this by saying that if a company has not accepted errors and faults before, and suddenly changes, that's quite difficult to change. In this case, the organization needs to show that it's okay to fail, and it is good to have a championship that tell good stories. Rsp6 (75), adds with another example that if the company is quite mature in its data-driven environment, people will be used to communicate using data, and they all become champions themselves.

"I think that you should find some really good promoters within the organization that are really supporting the project, are able to talk to end users in their language, not only from the project perspective, that is really important as well."

- Rsp3 (82)

4.3.5 People skills and abilities

We consider three kinds of skill sets in this factor: skill sets for data analysts, skill sets for business users, and common skill sets for all employees.

Rsp3 (56) and Rsp5 (54) state that besides the technical skills, understanding of the business is very important and helpful for data analysts. Rsp3 (56) explains that they need to be curious about the clients or the company's business model to build technical solutions that really helps and support. Rsp2 (60) also agrees that it is always good to have one person who multi-skilled.However, she also emphasizes that it will not be easy to find that person, and it's better to collect the team that together has all the needed knowledge.

"not really. It's like, it's always good, to have one person with everything. But how easy is it to find that person. Then it's better to collect the team or persons, but together has all the needed knowledge. Because one person, even if he has all the knowledge, is only one person. And so, you can kind of get the same thing with the team."

- Rsp2 (60)

Rsp4 (105) strongly agrees that business users also need to have the knowledge on how to work with data. Rsp1 (93) has the similar opinion that BI will be a commodity, and everybody needs to take responsibility for the decisions and become data driven so much in their minds that they are motivated to seek for answers themselves. Rsp5 (62) also claims that it is important that business users have some kind of sense of what they could do with BI or data.

"So that's what I'm saying is the competency of the digital age, that you can't leave things to others. You need to take ownership and you need to act on it, right? Because data is yours."

- Rsp4 (93)

Rsp3 (64), however, notes that business users should not be that technical or self-service, in other word, they need to rely on the data analyst or the BI department. This is because that in his opinion it is not that mature yet in many organizations (Rsp3:66). He also states that there will be an increase of self-service in the long run.

"I think that they should not be that technical, they should rely on the data analyst, but they should also rely on business controllers who have a little bit deeper understanding than the normal business users. But they shouldn't be that self-service, so to say from the BI perspective, they need to rely on the data analyst or the BI department...Because I think in many organizations, it is not that mature yet. Self-Service will increase, but then users are not that highly skilled that they can actually take command of the tools yet. But yeah, in the long run, yes, I will for sure see an increase of self-service, but we are not there yet."

- Rsp3 (64;66)

Besides technical and business understanding skills, most respondents (Rsp2:58; Rsp3:54; Rsp5:52) emphasize the importance for all employees to be open for change. To be specific, to have some kind of innovative thinking and curiosity (Rsp5:52), and to be open for new information and look into new directions for better decisions (Rsp3:54). Rsp3 (54) claims that it is very much about culture and leadership.

Rsp4 (95) provides the three skills that in his opinion are the fundamental competency in the digital age: communication and influence; process discipline and datanomics. He came up with two new concepts: datapreneurship and datanomics. In his explanation, datapreneurship is about knowing what to do with data, and datanomics is managing and understanding the value of data.

"I think you have to be, today you need to have some kind of innovative thinking and curiosity, very important. you have to be willing to adapt to changes. "

- Rsp5 (52)

"So that what I said, it's a competency. The competency is made up of skills: communication and influence. Second one, is process discipline and third is datanomics. Ok, so what I teach and what I tell is that, ok, these are the fundamentals that you need as a basic to survival, the digital age for any company to survive... Datanomics is managing and understanding the value of data."

- Rsp4 (95; 97)

5 Discussion

This chapter aims to present the key and interesting determinants for BI use from the empirical analysis and how these relate to theory. The discussion follows the structure of the conceptual framework of this study: technology context, people and process context and organisation context. We further discuss how these determinants lead to enabling organisation transformation towards becoming data-driven. Finally, based on the knowledge about the most important determinants of BI use obtained from the research we propose the key CSFs for leveraging BI for enabling organisation transformation towards becoming data-driven.

5.1 Technology context

In the context of technology, *seamless integration of BI with other systems in the organisations* is strongly correlated with successful transformation toward data-driven. The higher the integration capability, the more the usage of BI organisation wide for business decisions and thus the more the organisation become data-driven. This is in line with a study by Wixom and Watson (2001) who argue that users will more readily use BI or analytics applications and technology if they fit naturally into their computing and information environment. Likewise, when it comes to access, for a truly data-driven organisation, access to data must be democratise, opening greater access across individuals in the organisation. Everyone form the top management to the clerk should be able to have access to data and get used making decisions based on data. Furthermore, providing appropriate *user access* based on the business process and its relevance is also key to enabling strategic BI use leading to enabling a data-driven organisation. Otherwise lack of appropriate access may lead to frustrations from the users and hence avoiding using the system for the purpose intended. On the other hand, user access is also a sensitive issue and organisations must ensure that users get access to the relevant data they need to make decisions and according to their role. This shows similarities with a view by Bill Hostmann (2009), organisations must consider several requirements such as what roles the users play in analytics, business and decision processes as well as what metrics, data and applications do they need. As access directly affects the users in the BI environment, the kind of access available will determine how well BI initiatives will succeed.

Flexibility and risk management factors were surprising not much emphasised or thought of by our participants. One possible explanation for this is that most BI systems today are well advanced, and flexibility and risk management factors have been already incorporated in the systems. Thus, though these factors are important, this study finds flexibility and risk management factors necessary but not important in contributing to enabling data-driven organisation since these factors are perceived as given when organisations acquire BI systems for enabling data-driven.

Data quality had significant correlation with strategic BI use as when users believe that the data to be used for decision making is of high quality, they will then base their decisions on data and hence become data-driven. In other words, a BI system with high data quality improves the way data is provided to decision-support applications and decision makers and thus increases its use. This supports the BI literature that emphasizes that BI systems must contain high-quality data for data-driven decision making (Marshall & De la Harpe, 2009). However,

what this study found interesting was that though data quality was found to be positively related to BI use, it was also a source of obstacle to organisation transformation towards strategic BI use and thus transforming towards data-driven organisation. As one participant put it "The best is the enemy of the good" implying that most organisations are stuck from moving form the data collection stage towards the real use of BI for decision making due to worrying if they have high data quality. In addition, our findings indicate that data quality issues will always be there hence organisations need data with good enough quality to begin their organisation transformation journey towards becoming data-driven. The quality of data need not be perfect, rather it should fit its purpose. Furthermore, data quality issues are usually caused by lack of understanding of the organisation's "bigger picture" from the person entering the data. Hence to avoid such challenges, organisations must ensure the whole organisation is involved in thinking the data-driven way. From this perspective, to enable a data driven organisation, it crucial that everyone is empowered and proficient in working data. When everyone is empowered with data proficiency, the issues of data quality will be minimised significantly.

5.2 People and Processes

In the process context, our study found out that in line with literature Anderson (2015); Delen and Demirkan (2013), centralised as opposed to decentralised analytic capability is more encouraged in terms of strengthening organisation-wide analytical capability. This means that organisation should have an analytics department with data scientists and data analyst that provide an overall data knowledge across the organisation. On top of that, each unit should also have a person that is responsible for the analytics of that unit. This is what one participant dabbed as a hybrid analytic capability where by the analytic capability is partly centralised and partly decentralised.

In terms of people, what stood out for us was the skills needed to enable a data driven organisation are not just technological skills. As mentioned previously, in a data-driven organisation, it is indeed important that everyone is empowered and proficient in how to use data. This implies that employees are able to read, analyse, argue and work with data. This can be done through impromptu training on a regular basis, given access to dashboard and tools that will enable them to make fact-based decisions. When employees become data literate, they will on daily basis use accurate insights to make important business decisions, drive business growth through new discoveries through data and achieve more in their jobs. However, what makes the difference is that they must also possess innovative thinking, curiosity, the willingness to adapt to change, willingness to make mistake as one learns through mistakes, business acumen and be open for new information. Our findings also came across a new term called *"datapreneurship"* summing up people's skills and abilities required in a data driven organisation. Datapreneurship is about personal accountability towards data. Everyone in the organisation must be accountable in asking the right questions, communicate with data and use insights to make every business decision.

5.3 Organisation context

The organisations factors: management support, business champion and user involvement were highly emphasised by all of our participants as crucial to enable a data-driven organisation. Management support is key to ensure organisation-wide learning and data stewardship. This is not surprising as it is in line with the literature in CSF for BI and another IS which emphasize on management support in terms of sponsorship (Remus, 2006; Selim, 2007; Yeoh & Koronios, 2010) . However, to enable a data-driven organisation, the support from organisation is more in terms of actively leading by examples. Management must promote and communicate the power and use of data on a consistent basis by doing so themselves. This can be done through stipulating examples of a unique customer insight that resulted into a new business opportunity. Furthermore, this could be through showcasing how a unique customer insight led to a new business opportunity. Individuals employees who have new ideas that are backed up with facts and statistics should be encouraged by signing off the idea to encourage others to do the same. These practical examples among others will help employees individually to transform smoothly towards a data-driven way of working.

Interestingly, a new perspective on management support that was not covered in the literature indicated that management support could also be shown through encouraging a culture of failure. By allowing failure, organisations can learn a lot and possibly come up with a better outcome or a new business model. When employees learn that it is ok to fail, it encourages further curiosity to learn from the failure. The focus should not be on the failure, rather on looking for opportunities and new knowledge from the failure. Employees should be encouraged to view data and ask questions that have not been able to be asked or answered before. Furthermore, investments should be based more on establishing knowledge-based centres that focuses on helping people who are less data literate to up their skills and encourage the ones who are more data literate to share their knowledge on how to get value from data. The emphasis should be on transparent use of data and easy access to all dashboards and tools that exist across the organisation. As a result, all employees within the organisation with varying levels of data literacy will have the opportunity to achieve more with data. Thus, investments in new tools and technology will be based on user involvement, whereby the tools will be answering the right questions for the employees leading to obtaining organisation-wide early buy-in.

On the other hand, by leading by examples top managers naturally becomes business champions, advocating data-driven culture. A top manager could for instance send an internal email once a week that shows statistics on how data services have driven improvements cost savings in a particular product. In this way, as mentioned previously, the organization will be more open where by people can interact and share issues that happens within different parts of the organization. By providing evidence that analytics have solved real, everyday problems, data quickly becomes deeply ingrained in the business.

And lastly, successful BI use is evidenced when BI become a tool used by employees across the company in decision making and knowledge generation. This happens when both staff and management embrace the changes that data-driven insights bring about to their business. Notably, when end users are supported by really good reports, dashboards and other easy to use BI tools, the transition towards data-driven decision making within organisations becomes easily achievable. Accordingly, data-driven decision making is defined as basing decision on facts instead of intuition implying that people don't take decisions from what they think or what they believe but based on the data that they have. By putting BI in the hands of every

employee, everyone becomes a fact-based decision maker and it ensures that everyone is on the same page with the most updated information. This way, there are no "different versions of the truth" floating around in different spreadsheets, and every user has a consistent experience across platforms (Pedersen, 2015).

5.4 CSF for leveraging BI for enabling data-driven organisations

To enable a data-driven organisation, BI plays an important role in providing organizations with application software and other technologies to gather, store, analyse, and provide access to data, and present that data in a simple, useful manner for decision making and knowledge generation. The knowledge about the most important determinants of BI use obtained from the research has become the basis for identifying the most important CSFs for leveraging BI for enabling organisation transformation towards becoming data-driven. Drawing from the BI generic environment as proposed by Wixom and Watson (2010) we identify four categories of CSFs as organization, people, process, and technology (Table 8). People and processes have been split to different categories to signifies importance of each context. These categories have been influenced by the BI generic environment as proposed by result from the factors that affect the BI use.

Table 5.1: CSF for leveraging BI for enabling data-driven organisations

Category	CSF
Organisation	• Top management support • A culture for accepting and encouraging failure • Continuously dedication to building analytics culture • Business champion
People	• Combined skills of technical know-how and business knowledge for analysts. • Personal accountability towards data (Datapreneurship). • Organisation-wide data literacy
Processes	• A hybrid analytic capability. • Data spreading activities. • Centralised data management.
Technology	• Seamless integration with other systems. • The right user accesses • Data quality that fits its purpose

6 Conclusion

6.1 Research question

This study explores how BI can be leveraged to enable data-driven organisations. Drawing from BI literature and CSF theory, we reinforce the argument on leveraging BI in order to enable organisation transformation towards becoming data-driven through empirical research. In particular, the aim of this study was to answer the research question:

"What are the Critical Success Factors for leveraging BI to enable an organisation transformation towards becoming data-driven?"

The answer to the research question is based on empirical findings from qualitative interviews. The research was conducted with subject experts in Business Intelligence and analytics.

6.2 Key findings

It has become apparent that "data-driven organisations" has become a buzzword that describes what many enterprises hope to gain or fear to lose right now. Being data-centric is a by-product of the information age, the way of the future of doing businesses. However, becoming a data-driven organization takes time, efforts and a companywide commitment to infuse analytics into all operations (Pedersen, 2015). Data and analytics must touch nearly all aspects of the business adds Pedersen (2015). This implies that BI and analytics should be leveraged and become tools used by employees across the company, with both management and staff embracing the changes that data-driven insights enable in decision making and knowledge generation.

Thus, to successfully leverage the potential of BI to enable organisation transformation towards becoming data-driven, organisations have to proactively work continuously in the domain of technology, people, processes and the organisational context. In the technology domain, the right user access base on the role and BI system integration with other existing systems play an important role in making a seamless transformation towards data-driven. The power of data multiplies when BI is integrated with other data sources to bring to light interesting insights (Olszak, 2013). As this will encourage users to utilise the tools and systems required for working with data. If different departments use different systems with minimal integration, then the data-driven transformation is bound to fail. To transform an organisation towards becoming data driven, it is crucial to make the most effective use of data by sharing and integrating. Furthermore, despite that data quality is critical for making right fact-based decisions, this should not pose as a hindrance towards the transformation. Organisation can aim to start small with the data they have, and perfect the data on a continuous basis. As Isabelle from Acando puts it "Being data-driven is not an end goal, it is a continuous journey."

As for processes, a hybrid analytic capability is more ideal whereby organisations can have a centralised analytic unit with core functionalities and that provide data governance for the whole organisation and analysts in different departments that know more about their business

and thus knowing what technologies or tools are mostly needed to answer their questions. Moreover, data must be centrally owned as individual or departmental data ownership can provide the feeling of power to just a few people in the organizations, leading to reluctance in sharing it and optimizing its use (Wixom & Watson, 2010).

In nutshell, the study found out that the key to enabling a data driven organisation is through a strong management support whereby through leading by example, top management will conduct all business decisions based on data, encourage employees to fail and learn from failure and continuous build up organisation-wide data literacy also known as datapreneurship competences by setting up data and analytics knowledge centre. By creating an open culture of learning from failure, organisation will equip themselves with employees who are not scared to ask the right questions or seek answers to questions that have never been answered before. Thus, when BI is leveraged with factors such as management support through leading by doing, seamless BI integration with other systems, the right user access, hybrid analytic capability and centralised data management, data can be transformative for organisations as the power of data is utilised and realised and thus enabling a data-driven organisation. All the stakeholders involved from non-technical employees, top managers, and data scientists need to continuously work together to create a culture that enables a transformation towards becoming data driven.

6.3 Future research

Although much literature exists about BI, the BI field offers a wealth of research opportunities for academics to explore. Thus, we propose that future research to further explore how BI use has affected organisation agility and performance. In particular how does the use of BI for decision making make a difference in the organisation?

Furthermore, it would be interesting to understand how BI use differ globally depending on region such as Europe, Asia and Africa as also proposed by Wixom and Watson (2010). This is due to that the use of BI is uneven around the world (Watson & Swift, 2002). The northern Europe (Sweden, Norway and Finland) are well advanced in terms of BI use as well as North America. However, quite behind in Asia and Africa (Anderson-Lehman, Watson, Wixom, & Hoffer, 2004). These differences may be due to differences in culture or economic development among other reasons (Watson & Swift, 2002). For example, would economic or cultural factors affect how BI is used? How can BI be better tailored across a diverse global setting? What practices can and cannot be simulated around the world and for what reason? Studying these practices could provide additional insight in the BI field.

All in all, we agree with Wixom and Watson (2010) that it is fascinating to consider the progress made on the path from decision support in the 1960's to BI today. However, what's even more exiting is the opportunity for academics who seek to further our understanding of the future (Wixom & Watson, 2010). We will therefore close by inviting researchers to look at the proposed underexplored or unexplored research topics that we believe exist for BI academics today.

Appendix 1: Interview Guide

Entry

1. Can you briefly tell us a bit about your organization, your current responsibilities and your experience within BI?
2. How do you understand the term “data-driven organisation?”
3. In your experience, what are the motives behind for organisations to become data-driven?
4. What is the role of BI in enabling a data-driven organisation?
5. For an organisation to be successfully in being data driven, what is more important: is it the right technology and tools, or the right skill set and processes or the organisation culture that supports data-driven? How do these influence each other?

Discussion

Technology

1. In our knowledge, data is key to data-driven organisations. How does data affect an organisations’ data-drivenness or lack of it? What are the challenges do organisations face when it comes to data?
2. So research would claim that data quality is critical for a data-driven organisation, what is your opinion about it?
3. How should data be managed, and who should be responsible for it?
4. How should access to data distributed across the organization?
5. Are BI systems and tools usually integrated with other systems for example sales CRM or accounting systems? Why?
6. What is your view on flexibility of BI? Do you think flexibility is one of the important factors to consider? (Flexibility is the organizational capability of BI to provide decision support when variations exist in business processes, technology or the business environment in general)
7. People, processes, technology and external events can present risks to an organization. In your opinion do you think BI can assist organizations to minimize uncertainty and make better decisions? If yes, how?

Organizational Context

1. In your opinion, what kind of support is required from management for the success of a data-driven organisation?
2. What would you describe as a data-driven culture?

3. What is your opinion about fact-based culture? In your experience, how should organizations practice a fact-based culture?
4. In organizations currently employing BI systems, is it popular that one can always ask for additional information, challenge assumptions?
5. How should users be involved in the implementation of business analytics new technologies and systems? (e.g. ask users about their requirements when implementing new system)

People & Processes

1. Should the analysts be centralised or distributed to different units? What are the pros and cons for both?
2. How should data stored in an organization? Should it be centralised or decentralised? Why?
3. What activities do you have in place to instil data-driven decision making and knowledge generation (E.g. physical screens displaying data visualisation, daily dashboards that describes key metrics, metrics meetings)?
4. Is it necessary to have a business analytics champion in every department? Why?
5. What skills are required for analysts in an organization? For example, a strong skill set that combines technical and business acumen.
6. In case of the business users, what is your opinion on whether they should have knowledge on how to work with data and BI applications or should they rely on IT and data analysts?
7. In general, how do employee's skill set contribute to an organisation being data-driven? What kind of skill set are needed and why?

Closure

In terms of data-driven organisations, what other factors do you see that are important to enable data-drivenness and we haven't covered yet?

Appendix 2: Interview Transcript [Rsp1]

Date: 13:00, 15th of May 2018

Duration: 72 minutes

Interview format: Face-to-face

Transcribed by: Qinyan Ye

Transcription checked by: Robi Morro

Transcription date: 16th of May 2018

Researcher 1: Robi Morro: RM

Researcher 2: Qinyan Ye: QY

Interviewee: Johan Rastenberger: JR

Company: Enfo

Row	Speaker	Text
1.	RM	Yeah, and this will be treated with a high confidentiality. And if you would like us to share the results, we would do that.
2.	JR	Of course. It's very interesting to see what the output of your thesis would be.
3.	RM	Okay. And is it okay that we mentioned your name in the company.
4.	JR	Ok.
5.	RM	So just to start, can you please tell us briefly about Enfo and yourself? Your experience, what you do here.
6.	JR	Ok. So Enfo is called midsized company, about thousand employees in both Sweden and Finland. And it is a mixture of competences that relate to each other. We work with integration, integrating systems, which is very nerdy. We do analytics, like in the area I am in. We're also doing security, asset management, and other IT related services. And we have management consultants working especially within the industries in Sweden. So, we are quite diverse, being such a small company, and our main clients are mid-sized companies. We have some big ones as well. But mid-sized companies are our usual clients. That's a little bit about the company. I've been working with business intelligence and you call it whatever you want to. These names change often, but they mean the same thing, for seventeen years. And mostly in Denmark. I actually not always, but since my education, I've been living in Skåne. So, I've been commuting to Denmark for sixteen years, and I stopped last year when I started here.
7.	RM	Okay.

8.	JR	So surprisingly enough, it's quite much easier to communicate in your native language than in a foreign one, I found that.
9.	RM	Haha, you found that quite late.
10.	JR	Yeah, I found that quite late haha. I have heavily invested in speaking Danish, and that's a very difficult language. So, I didn't want to, you know, waste that. But I think the time was right. So, I've been doing all things within the discipline. I've been doing development, project management, you could say of management consultancy, all different things you could ever think of, I've been doing to some extent. Which is one of the great things of being consultant, because you can be curious, curious about things and curious make things works. And the best way to do that is to work with the things you are curious about. Many different kind of industries, public institutions, unions, whatever, broad range of different kind of companies and institutions.
11.	RM	Great. And so, what is your understanding about the term data-driven organization in your own opinion?
12.	JR	Yeah, the good thing is one could always ask oneself, does it exist? Because we tend to, this is immensely human that we rationalize our own decisions, and we decide first what we want, and then we make the statistics to support it. And I think it's really hard to come beyond data. It's also something about how you are like a human person. Are you emotional? Are you analytically mind? You know, all these different personal tests, are you a blue person or a red person or whatever? the blue persons are very analytical and want to understand this before making a decision. Very many people are not that, including me. Data and information is very interesting. Insights are interesting. And I think to be data-driven is somehow related to that you haven't made up your mind before you get the facts on the table, that you are actually having an idea, aha ok it would be interesting to develop a new era within the business, ok let's see, what do we have? What do we know about markets or whatever, and then you start to look into that, oh Africa would be an interesting place, I never thought of that and potential. But I think that data-driven organizations, that is a kind of a vision, and it's not wrong to have a vision. You might not ever be completely data-driven, unless you are made of robots, which might be the future. And you become very data-driven, maybe too much. (previously 14)
13.	RM	Yes
14.	JR	So the vision is actually to have a counter measure to the gut feeling, that you strive to do that. You ask yourselves, why are we saying this? Why are we moving left while right? What is the purpose? Do we have the facts on this one? Having these questions. And I think they have to come down, the must trickle down in an organization from the top level. If the top level isn't data-driven, nothing else will be. So your boss have to ask you about facts for a decision. You have made a decision and why did you do that? And if you do that, it will trickle down all down to the receptionist or the factory worker. And of course, it has to be supported by tools. The information must be accessible. And that is often not the case. So even if you want to be data-driven and you can't, because it takes too much time or is impossible, that's one obstacle. But the thing is, it's not the only one. And you usually focus on that one, because we can understand that. Okay, buy some more licenses and hire a data scientist, and do this and do that. But you forget that the people actually making the

		decisions, they must accept this. They must learn to change. We don't like to change, do we?
15.	RM	No, we like our good old Excel.
16.	JR	So we have many obstacles in this vision of strive for being data driven. And I think the shortcut in being data-driven is automized decisions, or semi- automized, and why I'm saying that is because I've become head of our AI initiatives in Enfo Sweden, we're looking into what can we offer the market in case of artificial intelligence and machine learning? It's a very vast area. One example is that we have a solution called service point, which is actually a portal where we can order things. It's usually made for ordering IT stuff. Like I knew that I need new mouse, I need new whatever, computer. You order it. The order goes to somebody to confirm it, and then it goes on and on and on. And all this flow could be a decision flow. It's a kind of decision flow. Somebody needs something and people approves along the way, and it ends up somewhere it can actually delivered. Combining this tool with machine learning that has been crunching through history, like your order history. You always, every week you order a new mouse. Is that really necessary? Do I do eat them? Or if you order this product, it tends to fail usually, you should order another one. Helping the decision maker, all the one who's approving, or anybody else in that line of decision with information. You don't have to automate it because people are sometimes afraid of that. But you can serve something. I have a yes and no button, and I need information on should I do this or that? Then I get the report that is very much answering that question, and then you can actually choose to ignore it. But you do it on purpose, because you know something the machine or the information does not know. That's okay. And then of course, you can automate it. So it actually never been. It's approved by a machine. And that could be a kind of a shortcut of trying to force the data-driven culture into an organization quicker than only the soft values. I don't think you can do only that because we're still mostly human beings. But that could be one way of showing the way.
17.	RM	What if, for example, an employee gets angry and they decide that, okay, I'm just gonna order ten thousand, they got fired, and then they go to the machine and order ten thousand pieces of, maybe this. And then they get delivered.
18.	JR	Yeah, well, that would be the question, of course, if you have any limits. But people have to be accountable. I mean, you can do. I mean, I know people have been ordering from, RegionSkåne, the public health sector. They have this portal for ordering things, you can order things very rare there. Like one eraser, and they thought they would get a whole package of them, like ten or a hundred or something. It can be one, one little leizer.
19.	RM	Yeah, because it's machine.
20.	JR	Yeah, because they didn't read the text, didn't understand the description of what the order, and it could go the other way around, to order something in huge volumes. They didn't understand that. And usually there is no check points, because it's hard to make these rules. Is one enough or ten enough or whatever? But I think maybe artificial intelligence could help there because it could monitor these things and say, okay, usually people order ten of these at ten times.
21.	RM	Because it has learned from the history.

22.	JR	But I think being data-driven means that you are much more aware of your decisions you're making and asking do I have the right knowledge? do I know these things? And that is the key issue here, really. Because you can have a data driven company by only using excel. You could, a little bit hard, but you could.
23.	RM	Could take a long time. So what do you think are the motives that make organizations want to be more data-driven at this moment, because it's now a buzzword.
24.	JR	Partially because it's a buzzword. Because it is in itself interesting. I know a company, I would not name it, that their CFO have ordered the IT department to make the company data-driven. You can't order that.
25.	RM	No.
26.	JR	And you can definitely not order from the IT department. That's so wrong. By going back and ask him, but did you ask the CFO what he meant by that, by data-driven? No, he wants to become data-driven because the market is very competitive and he's afraid. So I want to be data-driven. Ok. Sounds really great, but you have to define what you want to achieve, by data-drivenness it is actually making better decisions, that you want to make the correct decisions, and that would be a natural thing in my world, if you want to strive for, that you want to make better decisions. Um, that's nothing all of that. So, but I think data-driven isn't that well defined. So when a company says that it want to be data-driven, you will have to ask them, what do you mean by that? What do you want to achieve? What is your idea of this? Because that can be completely different. It could be a fully automized decision processes. One part, another part is, what I talked about it, having the right access to date at the right time, in the right tool, in the right surroundings. I know for many many years and to some extent still today, some BI consultant talk about this BI puzzles and portals that you have all the information reported, which is of course extremely wrong and have always been, because you shouldn't go away from what you're doing to somewhere else to seek the knowledge, you should have the insights where you are. If you are in the syrian system, you should have your support there. If you are doing phone calls, you should have the phone or outlook or wherever you are, the information should be embedded, and you should be thinking of it. It should be a natural part of whatever you're doing. I mean, we don't think of IT today. We have I have computer have a mouse, of course I mean, I don't think we almost interesting today, how does it work? It's a natural part of our life. And that commodity we should strive for, analytics as a decision support should be as much of commodities as everything else, that we shouldn't think of it. As now it's interesting still, it was very interesting fifteen years ago, but everything we've chosen and we come into new trends and new things that takes over, And the old ones, they're as much needed, but they become commodity. They become something that you don't talk about because it is there. Unfortunately I've seen a lot of clients, even today, I just during lunch talk about a client with a clear mind about the how you can be a huge successful company and not be data-driven at all.
27.	RM	Really?
28.	JR	And that is actually possible today, yeah, still. But it won't be forever.
29.	RM	No.
30.	JR	But many companies are very immature in this, and very far away from being data-driven. And it's always a surprise when that hits you, oh my god, so many shops and

		some huge amounts of money going through here, and they have no control of that. Of course some, but still not really mature.
31.	RM	Yes, so if you look at different context of data-driven organization, you would agree with us that technology also can contribute to an organization. So let's talk for example, different types of technologies. What are the key capabilities? Would you say that it's business intelligence technologies? What are the key capabilities that you think would contribute to an organization data-drivenness?
32.	JR	Yeah, that's interesting because I don't believe that you can have one tool. You must have several technologies and tools to cater for the different needs.
33.	RM	Okay.
34.	JR	And you would need to define what your needs are. You would need to have maybe very hard core advanced tools for statistician or data scientist or somebody like that. But you would have really need to have easily accessible, it has to be easy to use, the main tool, for ordinary people would need to be easy to use. And technology helps that, but it's also how you can figure that technology. I mean you could do very advanced, difficult to use things in Qlik or Power BI, if you want to. Why would you? It's actually quite hard to make things simple and adequate. Right?
35.	RM	Um,
36.	JR	I think technology can leverage in that way. I think I mentioned it earlier when I said that you should have BI everywhere. Wherever you are, you should have some kind of support, if it's your phone, your field doing something or looking at the screen or whatever you are doing. I think, a company benefits best when they can get their data-driven decisions trickle down to the many small decisions. If you have a management, they have their own team supporting the making all the reports in the world they want and their primary BI tool would be Powerpoint, which isn't BI tool, but that would be the tool that actually transfers knowledge to the management. You can't do that from the whole organization. So, you would need to have for the many small decisions, like, should I buy this pen or not? Should I do this or that? Should I check somebody in at a hotel or not? all these small decisions? So if you get them data driven and you can get them by making the technology support these individuals that are not thinking data, that would be a very important feature, accessibility.
37.	RM	Yeah. So user access, that's what you're talking about.?
38.	JR	People should be given access according to their needs. So if someone is only doing an ordering things, they should have access to BI tool that give them the power to order things according to their data. That would be the best. And if it can't be that good, it should be at least closely related. So it's not far away. And here I also mean that the users are not technology-driven. They're not interested. It has to be easy. And it has to be served in a way that they understand it. And that means that it lacks probably a lot of things. Then you would have had other tools. And you have to have a set of tools for different compass.
39.	RM	So what are the complementing tools?
40.	JR	So complementing tools, in the heaviest area, you will have Matlab and you would have, RStudio, and these things for very heavy analytics work, far beyond my

		capabilities. Then you would have, there are so many of them. I mean, you could use all of microsoft's tools or the Power BI stack. I mean Qlik has new tools that are more advanced. Tableau is a great tool for analysts who wants to discover and explore data.
41.	RM	Visualization.
42.	JR	Yeah. And then the other hand, you have these more of a double clients that are really easy you can incorporate. I know my knowledge of tools are, of course, labelled by the fact that I've been working with certain tools more than others. So I can't give the whole. But I know that Power BI you can embed, you can embed that in an app, you can embed that in the homepage web page, you can embed that to somewhere. And I've seen it being used in factories. When factory workers need access to information, they can get that through this embedded function. So they don't have to worry about anything. It's just there, on a screen or on the phone, or somewhere. So I think customization is important that you can actually take the tool and implement it in different scenarios. But I would say that, tools are a little bit like cars, we have preferences. And if you have hired somebody who is very skilled and helpful, and he or she says that I want this tool X, I know this tool X best and I feel good working with it. Give him or her that tool. And don't say, oh, it's not company policy to blah blah blah. I know you can't support everybody having all their own tools, but most people want to have that strong feeling for something. But somebody, give them the tool that is adequate for what they want, what they like, to work with. And they will of course develop and tell others how fantastic this tool is. And these things changes all the time.
43.	RM	Yeah,
44.	JR	And more so today than previously, both Qlik and Power BI are updated very often. I think the other ones are following congress, and everybody are following on. And Power BI is updated every month. The web version is updated every week. So what you can do, what you can't do now with the tool? You can do that in six months maybe, you do not know. So these things changes, and they go quicker and quicker and quicker, which makes it very hard to be a good advice on what to use, because the truth changes all the time. And it will do so even more with the cloud-based approach, where everything is centralized in a cloud, because there they can update things all the time continuously. So you don't what version? I don't know. I don't know. And just the tool, it's the latest version, I guess. Can't avoid it.
45.	RM	And just to add an additional question to that, the integration of, for example, this BI systems with existing system, is that key to a smooth transition?
46.	JR	I think we're talking about two kind of integration. One of them is, of course, the integration of importing data, getting this into the BI system, that would have to be automated. Otherwise you really need for a heavy manual burden, and it won't last long before you kill yourself. Oh, horrible thought. But then you have an integration I talked about where you can actually integrate it into other systems like visually, you're seeing things from there. I think that is quite important to have an idea about how to do, because we are getting away from papers, and I think it will always be a blockage if you have to go somewhere else.
47.	RM	So the integration you're mentioning is getting data in and also getting data out.

48.	JR	They can be different challenges. We always been working with getting data in. I mean that's a big purpose of them. And that's a huge obstacle in itself, and will be for the foreseeable future. But getting out is also important. And I think we need to be more focused on the people and the processes, and what that requires of the technology, and then find the right technology at that moment, and not think this is it, we're doing this for fifteen years. Because lifespan is so short with these different tools and what is appropriate. You have to be more agile. And I think agility is actually one of the things that blocks a lot of data driven decisions, because we are moving away from a centralized view on data. When you have one IT department ruling and deciding who is to see what, into a much more grassroot, liberal or anarchy, if you see that like that where people using data much more actively themselves. And when you as a company decide you want to use a tool for the broad user base, you must think of what comes with it, because every tool has an idea, a vision. Power BI, for example, has the data share culture vision, that everybody shares with everybody. And that might be a vision, because that will never happen. But it supports it. A lot of functions you can't stop, because they're there. Everybody can import anything into their Power BI tool, and do whatever they want. Nobody can stop that. Because that's what it was meant for. Then they have matured it and put some functions in it, in order to be more corporate accepted.
49.	RM	Yes.
50.	JR	But it's not native. It is out of construction. And you can feel it, because there's so many things that looks weird and feels weird with it. And if you go for Cognos, which is much more of a tool that is made for corporate reporting, from the beginning, they have problems in the other end, they are much too much of that corporate centralized. So when you buy a tool, you actually also by the whole idea of what it's meant for, what is it supposed to do, what is supporting it? Try to analyze that and see are you ready to do that? Are you ready to take that step?
51.	RM	So that take us to the next question that, about flexibility of the organization. So are you saying that when organizations are deploying BI tools, they should consider a system that can actually be flexible with the business processes and policies, or should they change their business processes and policies to fit to the BI tool. Which one do you think is ok?
52.	JR	I've been working at Denmark’s largest SAP.SAP is a real German joke, They've told me from the horses mouth that you are supposed to work like SAP, SAP will not work to support you. It is user who is supposed to adjust. And this is a very evil thought. And it has habits idea that it's rational, because if everybody works the same, if all the processes are the same amongst companies, and they use the same standard tool, then it will become very cheap, of course, because you only need one modification, except the SAP isn't cheap, has not been cheap, and it causes frustration, it causes unhappiness, and unhappiness is very expensive, very expensive.
53.	RM	Cause people can leave.
54.	JR	Because and we don't want to comply with the computer says you to do. Of course, flexibility is the question of definition, because not any tools are completely flexible. They all have their ideas on how you want to work with them. Those who program and design the systems have had something in their mind would to do that. And if you against that, this could be hard. But it's not impossible for most systems, not even SAP because you can actually buy modifications to it. But then you can't upgrade it, and it cost your fortune anyway. So of course, the tools have to support

		your processes. The unfortunate thing is that in most cases, people buy first a tool, and then they found out how we go to work with that. Because people still believe that the tool is enough. We buy this tool, everything will get solved. How fantastic! And then it won't, then they will find out, okay, we need this and we need that. It's born in the wrong end, the idea, you should, like your question, how to be data-driven, you should start there. What do we mean by data-driven? Find out what are the activities? What do we need to change to become data-driven? Okay, we need forums where we decide things where we have decisions ready made for uh, no decisions, but information ready made for us. And we need this, maybe this, semi-automatic decision flows and all these things with people around it. And that could be the goal. And then you construct things to that. You don't buy a tool and a little bit of that. And the magic happen. No, usually not.
55.	RM	Yeah,
56.	JR	And it takes time. You want to go quickly. You want to go fast. Well, then you have to fire everybody, because people change slowly. You have to sell, sell the idea to them. Why should we do this, what is the purpose of this? And the selling part is very expensive, and takes a lot of effort. So that is absolutely crucial for success.
57.	RM	We agree. Let's talk about data quality. Data is very key for data-driven organization. So tell us your view about it.
58.	JR	The best is the enemy of the good. Never put a financial business controller in charge of a BI project, it will kill it immediately. Because there are always data quality issues. The only system that usually never have any data quality issues is the financial system, because they have whole departments working with numbers and checking them up and down. But that's only there. HR systems, everybody, all the other systems have their faults. And it's not a one time off, that you go in and clean them, then it's clean. No, it's a continuous process. What I meant by the best being the enemy of the good is that, you need good enough quality. You don't need the best quality for a decision. If you're going to make a decision on how should we react on the market trends in the becoming ten years or five years. If there is a five percent deviation, which would be a catastrophe will be financial system. Who cares? Does it go up or down? that's the important thing. Are we growing? Are we decreasing? or whatever. And by exact amount of number? that's not that important. At some point, you need high data quality for certain things. But and you should be aware that it always hit you because that things you can't do because you have such poor data quality. But you have to begin somewhere, and beginning somewhere is by actually working with business intelligence or xx or whatever it is, because then you get focus on it and say, okay, this is the issue, and then you start thinking how can you improve that. And one of the improvements you do is that those who enters the data of the system, they get something back. Because if they enter things into a system and never ever get anything back, they don't care about what they enter.
59.	RM	So it must be the people that will actually need that data, these should be the ones entering.
60.	JR	Yeah, they would do that because in the first place, but actually that's where the data-driven is a good thing. Because if you want to be data-driven organization in all your decision levels, then even the lowest level of this, those poor people that are

		entering things in the system, they will also have a reason to think of data, and data decision, and data quality, because they are taking decisions upon it. Usually today when we have these data quality issues because somebody very low in the organization enters data, and the only other one who is crying for high data quality is management. And there's quite many steps between there, and nothing happens, or maybe something happens once, and then they forget it or whatever. So, involving the whole company in thinking in data-driven way will also contribute to better data quality. It comes like a nice side effect. But that's always an issue, always.
61.	RM	So what would you call data that has a high quality. How would you define it?
62.	JR	It has right quality for its purpose.
63.	RM	That's very interesting definition
64.	JR	Because you know what, I've been studying quality because I did study horticulture. And horticulture is about vegetables and fruits. And what is a good apple? What is a good tomato? What is a high quality, whatever, cucumber? Now because of EU, we have regulations, we can say that, oh, this is a first-class tomato, it has no issues with colouring or anything. We can define that quite well. But it is first class, C class, whatever, second class qualities is not bad quality, it's you pay for it. Yeah, I mean you pay a lower price. So, you get a quality that is appropriate to what you expected. And then you can get higher quality for what you expected. You buy something you thought you bought is cheap, and then you get something premium. So, I think when it comes to data quality, is it has to be as expected, it has to deliver its purpose. I mean, if is for like a trend analysis, you can use poor quality data because it's good enough, and it's not poor, it's actually is ok, because it fulfils that purpose. A controller would cry. No control would like this one. So, if you think of high quality being very accurate, very descriptive of the true situation, that might be a very high price. And the high price for getting that, like running a financial system, will you do that in all other systems, it would become so expensive, that you don't get business value out of it. What's the idea of the third or fourth decimal being right on this one? It doesn't matter for nobody. Why do it. Why waste so much energy, time and frustration on that? The hard part is, of course, defining it. What is good enough? And here again comes the main blockage, human beings. Because they don't connect always these things. It costs a lot of money to have this about the sky, fantastic numbers that are completely accurate. They want that but don't want to pay for it. I think it's important to put some kind of value on things. It's like internal meetings, the meeting we have now, it costs Enfo about one thousand Krona to have this meeting.
65.	RM	Really?
66.	JR	Is it worth it? Well, I made the decision it was worth it.
67.	RM	Ok.
68.	JR	But you could put numbers on any anything you could. Is it worth that? Should we collect all in the office now to have a chat with you for one hour? Now, that would be worth twenty thousand dollars, starts becoming expensive. So, a little bit the same with data quality, it should be good enough for what it's been useful. And that

		also means that it can change quality. It can be good quality for certain purposes, but below quality for other purposes.
69.	RM	What's your view on BI capabilities that enable risk management support?
70.	JR	You mean risk management generally?
71.	RM	Yes, for example, you've set your BI system to perform a certain way decision, but then sometimes in the organizations, things can change. So is that BI system able to support those changes? Would that be a key quality of a BI capability?
72.	JR	Well, what comes close to mind, if you have some kind of reorganization, you changed the whole organization or something like that? Or is it just maybe market changes?
73.	RM	Yeah maybe Market changes,
74.	JR	Ok, something external that affects you.
75.	RM	Yes. Then you realize what you have like, you need to do something. The system needs to give you something.
76.	JR	Yeah, but that can be hard, because sometimes it's not predictable. So you don't know what will hit you and what you need to research. If you need to find out the financial economical trends in the world or in your region, for example, what is an early indicator on that, things are going down now? Then you would need to be more exploitive and find new sources, maybe. It's hard for me to say that tool is supporting it or not. It's so much about configuring it and how you use it. Much more than tool itself, I would say. I would recommend everybody to work with scenarios. And it's always nice when you have a tool that can support scenarios. It can be simulations. It can be what happens if things happens. What if tests and things. What if half of our employees suddenly get ill, what's our consequences? Scenario is not the same as they are actually happening. They are just make you prepared for it. Like Shell in the seventies said that, what about if we are not an oil company anymore? What will we do then?
77.	RM	They're not now, right?
78.	JR	Yeah, I think they are still, but they have many other things. And I mean, in the seventies, everything is oil based. So it was really you thinking of that, daring to think, what about if we're not, what if Nokia once thought and then we are not going to make boots and car tyres, or something else? Well yeah, so I think most tools today would support it, it would be strange if they wouldn't support that kind of risk management. It's more the implementation.
79.	RM	Okay.
80.	JR	Maybe the thing is that is it easy for you to import new data sources? But that's again more of an architectural thinking. Are you taking consideration that you might need in a very short notice a new source of data. Can you handle that? Yeah, all systems support that, depending on how you configure them.

81.	RM	Let's talk about, when you have analytics in organization. What's your view about centralized and decentralized, you touched on that a little bit.
82.	JR	Yeah, I think some things you might need centralized, very specific competences that can be shared across the company. It could be data scientists or people working with those specific things. You would also need a centralized function for the core functionality where you actually have some critical, crucial things that has to be done and reported on, and it cannot I mean, it would be a great failure in the company if that would not work, you would need that to be centralized. And also supporting it would be of course and little, but you cannot only do that, you need decentralized analytics capabilities, more so than ever, because of things changes a lot, and centrally, you don't know what happened. And I think the analytical capabilities needs to be close to the decision makers. It shortens the time, it makes misunderstandings less more so, and becomes more adequate. The best thing is, of course, if people actually get their own capabilities to analyze their own decisions. And I think here again, artificial intelligence will help, because in the old times or today, a C-level person, somebody very important always get their information by picking up the phone and say, I need a report on the sales trends and our budget, and they get that instantly, because they're important. Well, the company can't afford giving that service to everybody, yet. But they will be with AI, especially with the speech recognition part. There are embryo of that already in many tools, like in Power BI, can write a sentence "What is the budget for the last one months?" It will find it, it will show you it in the appropriate way, in the numbers of graphs. And what if you get that voice control, then you will actually have your own analytics in your pocket. And it would not be human beings doing that for you, can today already get the tool to show you possible explanations of why the line chart is deviating. What is happening in the line chart? It goes up or down and there are bump in it or whatever, you can get that already today. These are the possible explanations for that. And that will happen a lot in a few years. So I think we should be ready for that and embrace it, because that will democratize the analytics capabilities. Everybody will get their C-level support. Isn't that fabulous?
83.	RM	Self-service?
84.	JR	Yeah, you will get the first-class service, even if you're just an accountant, or traffic, someone policemen on the street, or whatever. Oh, it would be great. Very hard to control the great.
85.	RM	Yeah, well, comes with challenges.
86.	QY	This can be a new BI capability that will contribute very much to data driven organization.
87.	JR	Yes you could say new BI capabilities because AI is, it changes. You don't know when you speak to AI, it is just there, it enhances something that worked previously. But it gives access to you in a way you didn't expect it to. You won't think of it as AI, you would think of it as somebody helping me through my work for example, to somebody isn't a person.
88.	RM	So that's the future we're talking about.
89.	JR	Yeah, the near future, be aware!

90.	RM	So, let's talk about now the companies like you're dealing with, that they're going through the journey of data-driven. So, business people, do you think they need the skills to be able to use this analytical tools, or should they rely on IT ?
91.	JR	Okay, no, no, of course not. I mean we had secretaries and typewriters in the seventies and eighties typewriting. We don't have that anymore.
92.	RM	No.
93.	JR	I told you BI will be a commodity. I think everybody needs to take responsibility for the decisions and have the data driven so much in their minds that they are actually seeking answers themselves. And it would only be for very few of us those not have a cellular phone or something, and high bosses that can have something served on a silver plate, until that revolution comes.
94.	RM	So what do you think should be the right support from management to enable data-driven. We talked about it initially when you spoke about it's not just about the technology, it's so much more. So let's talk about that much more.
95.	JR	So first of all, the management must ask for things, they must be curious and interested in asking for the information that the decision is based upon. That is crucial. They also need to have a culture of accepting failures. It's okay to fail once.
96.	RM	Yeah.
97.	JR	Because what people are afraid of is actually making the wrong assumptions from readings of the data. And it should be okay to do that as long as you are knowledgable, and you better yourself. You would, of course, need things like supporting processes. Like I mentioned the innovative person who is doing something interesting, try to support that person, say “wow, what a great thing you're doing. Let's take your wonderful idea and mature it so we can spread it to others”. You can't really send that out to others because it's against this and that. But this is the way to go, encouragement. And having these processes there, for the governance part, how to handle all these new ideas that comes in, how to qualify them, quality assurance them, and all these things, have thought about these processes in some way. Just get out there and do it, and don't be afraid. I think being afraid is one of the worst things we can do. And it's like, an IT department when they say that you can't do this and you can't do that, it's always a question about competency. They are not competent enough to show you how you should do it. They just say no. And that's what also risk here is that, you're not allowed. But the thing is people around decentralized analysis has been going on for ages. That’s what we were doing in excel We're not telling anybody. We're sending the excel sheets to each other, and the boses might never even notice it. So, in that sense, it's not new. The new thing is that the culture must be appreciative. So, it comes up to the surface and show the good things that are going on and help where help is needed. Because that is of course, the issue is that if you only say everything is nice and fantastic, then you get a wild west. And you don't want that. You need structure, even if it should be suffocating structure, it has to be positive good structure that people feel helped them. And that is very much a management thing. I think curiosity is a good word here, being interested and curious in your employees from the top level and down.
98.	RM	So yeah, so it should come from both ways. They should encourage it.

99.	JR	Exactly, because people can do more than you think, and maybe just a few things needed to actually, unless the potential, unless they have a very bad company culture. Company cultures cannot be mandated, cannot be decided by management. Management can courage things, but the culture sits within the people. And nobody has that power of others that they can say “Now we're going to be smile and be happy”.
100.	RM	Speaking of culture, so what kind of activities do you think can organizations do to encourage that culture of data-drivenness, like physical activities, for example.
101.	JR	Well, I think some different networks where you actually match people with similar job functions could do it. So they find encouragement in each other.
102.	RM	Okay.
103.	JR	You must find good ambassadors, people that are good, showing what you can do.
104.	RM	Like champions.
105.	JR	Champions, yes exactly the champions, very important. Maybe even, you know, telling about good stories. And I think I'm not sure if you are a company that haven't accepted errors and faults before, and you suddenly change, that's quite difficult to change, organization to show that it's okay to fail. Maybe you could do that by being a good example yourself like a boss. You tell them about your fails, you are done. I did fail this one, and it was okay, because I learned this and that from it. I think storytelling is important. Very important, actually. Both in why we're here, what is the purpose of the company, but also storytelling about good things, things that promote the culture you want to achieve. That's very much a capability. Many management can't handle it, but then they should think about it, and see how can people tell their good stories. Maybe even get the grassroots level approach to it, encourage champions in the grass root level to show their stories will help them.
106.	RM	Do you think, are there organizations that they have visualization? Like when you walk in, you see data?
107.	JR	Yeah, that is also interesting. I have a client that have a map of the office. And then you can see of each chair, you can see a dot if it's occupied or not. So you always get a map on how many seats are occupied, which is interesting. They love this sense of things, in terms of things what they you, that's interesting. You can have air quality at offices, or different other approaches, of course.
108.	RM	Yeah.
109.	JR	But I don't necessarily think that, just showing graphs and charts on one chart. From a management perspective that doesn't really feel important for you. As an employee, you get, oh my god, the manager trying again, showing these boring numbers to us. We don't care. That's where we need the storytelling. That's what I need to and support the storytelling by having the monitoring there, or whatever. But you can't just put it there and say, oh, now data-driven, because we have a number in the, you know, in the lobby.
110.	RM	So you're working with customers, how do actually assist them to see that they achieve results?

111.	JR	That is so different from where they are in the maturity. And usually it is when you do BI services for a company, they approach you with something they want to address. It could be an issue of some kind. It's great enough, having that. But they usually want the wrong thing. They ask for a tool or something they have in mind that would solve this or that issue, but what we are trying to do is, challenge them a bit, try to find what is the real purpose of this? What should we reach with this? And I think that's important thing that we are actually showing others. We are taking knowledge from different parts of other clients and bring them to new clients, because we have more here, we know a lot of clients, so we are bring knowledge from one company to another, that can talk to each other in normal case. And then we do some technical services, technical solutions, but I would say that we also do a lot of other things, advisory. It is not always so does advisory, because people usually, they not always want to be sold things. But when we are there, they won't mind hearing our opinion. And we would quite happy with CFO ordering data-driven.
112.	RM	Okay. Well thank you so much Johan.
113.	JR	You are welcome.
114.	RM	We really appreciate your time and your responses.

Appendix 3: Interview Transcript [Rsp2]

Date: 11:00, 16th of May, 2018

Duration: 59 minutes

Interview format: Phone call

Transcribed by: Qinyan Ye

Transcription checked by: Robi Morro

Transcription date: 17th of May, 2018

Researcher 1: Robi Morro: RM

Researcher 2: Qinyan Ye: QY

Interviewee: Isabelle Athle: IA

Company: Acando

Row	Speaker	Text
1.	RM	So just to start, can you tell us a bit about Acando, your current responsibilities and your experience with BI?
2.	IA	It's pretty wide. We're three big offices, one in Stockholm, one in Gothenburg and one in Malmö. And we work what kind, um, I wouldn't say differently, because we work in the same way, but work separate from each other in most cases. And Gothenburg is our biggest analytical office. And I belong to the Malmö office, and we have a smaller analytical division. Trying, of course, aiming to get bigger. But our experience with BI is, we have developers developing dashboard on both frontend and backend. And we also have data scientists and data analysts working with a bit more analytical parts and insight parts, insight-driven from data, and also the business perspective, how to extend the business value from data, how to improve the business. This is more of the data scientist role.
3.	RM	Ok.
4.	IA	So, we working on every feature of analytical or BI perspective. And we work with both Qlik and Power BI, and we work with R and SQL and all sorts of the tool. we also have some IoT specialist that works with more of the database structure, which is kind of the thing that actually makes everything else possible. So yeah, that is a quick summary of what we do. We're trying to be in every kind of perspective of this BI trip.
5.	RM	Okay. And what is your current responsibilities at Acando?
6.	IA	My responsibilities is that I'm a data scientist at Acando. So I'm working with everything from like the business perspective and the data perspective, to like the insight perspective that actually gives value to the business.

7.	RM	And how long have you been working as a data scientist?
8.	IA	I have been with Acando for three years.
9.	RM	Okay. So how do you understand the term data-driven organization?
10.	IA	To me or to us, a data-driven organization would be an organization that actually makes decisions based on data. But that is like an easy way of saying, because it's not just to base decisions on data, because you have everything behind as well. You can't base decisions on data if you don't have the data quality part. Of course, but well, that's a smaller summary. I would say that it would be an organization that is continuously working and never stops. It's not like you have a goal, and then you suddenly achieved it. It's a constant work, and it's when you use data, in order to bring your business forward.
11.	RM	Okay. And what do you think are the motives behind for organization to become data-driven at the moment?
12.	IA	I think the motive is, to put it in an easy way, we have things that we know and we have things that we think we know, which is a big difference.
13.	RM	Yes.
14.	IA	So, I would say that the biggest motive to actually become data driven is to make the things that we think we know the things we do know or don't know. Like failure is not failure, when it comes to data, is an insight. So, if you think you know something and that is proven to be incorrect, that is also an insight. It's better for your business than not to have it, to think you know something.
15.	RM	That is quite interesting. So just to add up on what you just said. Are you saying that, for a data-driven transformational journey, the organization should be ready to accept failures?
16.	IA	Yeah, absolutely, they should be ready to accept failures.
17.	RM	As a learning perspective?
18.	IA	Yeah, because you will learn something to be true as you have thought them to be. And you will also learn some things not to be true. So, they need to be ready for the part of course. And I have a great example which I learned at the data summit in Stockholm this year. There was a guy speaking about the company in the US, they didn't know why they didn't have that many customers in the store, because obviously there were a lot of people flowing around in the area, but they were not in the store. So, then they had this small device actually measured mobile frequency, so they could count the number of people being outside the store by putting that up outside the doors. And what that meant for them was that they gain data on how many people that visited the area within certain periods of time during the day. And for them, that also meant that they had the wrong opening hours.
19.	RM	Aha. Okay.
20.	IA	So, they found out that most people are there. They are not there within their opening hours. The main amount of people are there afterwards or before.

21.	RM	It's interesting.
22.	IA	So that is small things that you think you know something, you think you have the right opening hours, but you find out you don't. And that is a failure in comparison to your opening hours, but that is a possibility to change.
23.	RM	So also when you speak about change, also, organization should be flexible when it comes to changing the policies and processes.
24.	IA	Yeah. And that also makes a great person within the organization, a main player of the data driven organization. Because if you have people that are against change, they won't happen. Everyone, everyone, every single one needs to be on board on this.
25.	RM	So what is the role of BI in enabling data-driven organization?
26.	IA	Yeah, I would say the awareness role, to increase awareness. And that is also something that every person within the organization that has the decision making at least, or I would almost every person should be able to look at, and it should not be a dashboard just for the management team. It should be available for everyone to see the results that they are gaining in the dependent on their work. We do like this. What happened to the figures? I don't think there's anything more that could be motivating someone who works to see the purpose of their work. Many people today, I feel work, but they don't see the impact of their work, that also makes them less engaged.
27.	RM	Yes.
28.	IA	Which makes them if it's their manager will come and ask them to work late then they would probably say no. And then they will order them to work late and they will sour about it. But if they know what impact that would have used, I think they will see it differently.
29.	RM	So BI could actually help in bringing about data awareness?
30.	IA	Yeah, it will help bring awareness and also make the organization come together. Because you can see that two floors, most of the time, where you have the lower organization part, that most of the handwork they are on the bottom floor. And then you have the management which are on the upper floor, and they're kind of not communicating with each other. And the management level, they're saying something that they need to improve in order to improve the numbers. And they're trying to somehow communicate that to the bottom floor. But it's so hard because they would never share with them why they should change this. Why should they work late? Or why should they work differently? Because that is also when it comes to change. If someone should come and say, oh, you should work, but this is that. And you should prioritize this instead. And you think, but I know something on that. We have worked like this all the time previous years. Why should we change?
31.	RM	Okay. Gartner, they talked about BI critical capabilities. They mentioned quite a lot of them. But what in your opinion? What do you think are the most important ones? Because the organizations cannot possibly have everything. But what are the key ones that you would think are important?

32.	IA	Yeah, that's a good question. I think it comes down to more of a general point of view that not to be too advanced, because you don't need to be, everyone speaks about machine learning, AI, and all those kind of big buzzword. But to start your data-driven organization, you need to start simpler than that. And I think since we tend to talk about those big things, companies tend to not be willing to take that step, but you don't have to take that big step. In order to become a data-driven organization, you have to start somewhere. And then you can always start where you are. Because there was a trend a few years ago, that the company should start collecting data. And so, they did, so at first step, look at the data that you already have. And how can you improve that work with data quality. Make sure you have the right answers, or more or less I would say the right questions. But you want to answer, because if you create a hypothesis and question based on what you think you would like to know, then you can also see if your data holds up to evaluating those. Otherwise, you need to start collecting your data. And that is just like the small tweaks that you have to continuously do when you're about to become or if you are a data-driven organization.
33.	RM	Ok. What do you think about how BI integrates after the data quality is set up, for example, how about the integration between BI and other systems that exist in the organization.
34.	IA	I think integration with other system works fine. I have not yet seeing that to become a problem within an organization, that it would perhaps, as we talked about failure previously, perhaps we show that they use some if we say their CRM system,there is some features to use to handle their customers in a better way. And perhaps, the actual data analysis that you gain from the BI tool will actually show you that you're not working that well with your customers. And that you need to change. It doesn't mean that you need to change the entire CRM system, but you need perhaps to change how you work with it. And customer support systems is a great example when it comes to that. You tend to think that you do know, but not until you measure it. You actually do know why customers are calling in, are they calling in prior to appreciate, or are they calling in like to complain about the persons, or are they calling in to say how happy they are about it. If you only count the call because most like systems are quite basic, they come to call how many calls do we have? How many calls per hour? How can we use that in order to stuff up, but not why they call. Because if you knew why, then perhaps you can send them in a different channel, which also would decrease the amount of employees you need in the customer service. So it's not always about the first numbers that you see. It's more to dig deeper and gain insights based on that. So I would say the integration with tools is good, as long as you're open for what I call failures, but they're actually learning, and that will that you will receive in every system. And of course, not everyone will integrate well with everything. But as far as I know, there is a solution for most of the things.
35.	RM	Ok, that's the very good insight. And I think we were thinking about easy of use and visual appeal. Initially, you talked about that. It needs to be buying from everyone in the organization. So what do you think about the easy of use of the system in the visual appeal? Is it critical or is not that important?
36.	IA	I think it depends. It depends on where it's to be used. If it's a decision maker that is supposed to do analysis, and then of course it should be as easy as a person can do it or the person needs to be trained. That doesn't mean the whole organization needs to be trained, because it could be visualized through BI for people, even if they don't use it, they use it to see their impact, but they don't use it to analyse things. So

		there's like more of a several step process, but you have the people that actually want to see things. They want to be able to know that their impact in the organization. And then you have perhaps their manager which actually should make some use of the numbers to make decisions of its well for the organization. And then you also have the manager over him or her, which has a different purpose. And of course, the more you share, the more complex it will be. What I learned is that, the growth or the maturity of organizations is quite small because we have different age spam at every position and the age span is also, kind of like an obstacle sometimes, because some people are brought up to this and some people are not, they try to learn this for the first time. So then you have to tweak the complexity. A person that doesn't need to analyze things doesn't need to have the ability to do it either, because that will only make everything more complex and less likely for them to use it.
37.	RM	Yeah, true. So speaking of that, then I they should be several training then depending on the users level of understanding in the organization?
38.	IA	Yeah, it needs to be, because the whole organization needs to be in to be become data driven. I would definitely say that they need to be different types of training, to actually prove or show the importance or big gain that this can actually make.
39.	RM	Okay. So what is your view on flexibility of BI? do you think flexibility is one of the important factors to consider?
40.	IA	How do you mean when you say flexibility, flexibility in what ways?
41.	RM	So, we put a definition there. We realize that it might be a complicated. So, flexibility is the organizational capability of BI to provide decision support when variations exist in business processes, technology, or the business environment in general.
42.	IA	I think there is like a lot of different ways to work with BI,21:00 my previous assignments, I worked a lot with R to gain like marketing advantages for our company, and that is extreme flexibility in that tool, which is, of course, needed within my role at that point. So flexibility, yes, I would say flexibility is necessary and even for the kind of lower usage, it's needed because everything changes. And to be a data-driven organization, that means change can happen all the time, when you gain new insights. And if you don't have flexibility at all with in your tool, that would be a quite struggling change to make when you need to make it. If you perhaps need to involve consultant or anything like that when whenever you are to make a change. That is quite time-consuming and will decrease the speed of the change.
43.	RM	Yeah. And just to add on that, so do you think that BI can also assists organizations to minimize uncertainty and make better decisions?
44.	IA	I would actually say, BI is kind of, I don't know what to use BI for id not to make better decisions. Main purpose within a data driven organization, again, to make their decision based on what we you know and what we think we know or thought we knew. But you can of course you can always work as they have always work that is kind of well done this for fifty years, and we will continue to do it. But that will probably be their fall one day and even if they manage to do the right thing now, when nothing goes wrong, when something goes wrong, they will never know what change made it go wrong. So if you continuously need to make changes and everything works fine, for example, within an insurance company and you continually increase premium for customers. Nothing happened and everything works fine. Yeah,

		where is the break? where is the Like, where is the upper point threshold? you don't know. And many organizations tend to make a lot of changes at the same time, which is kind of against everything that hypothesis testing say. So if they do that, then they are not able to put the scenario in a box. And that makes them not be able to say what change made bad. Because they cannot differ between what is the first, was it A? was it B? was it C? Because we implemented the three of them at the same time. How do we say that A was the one causing this?
45.	RM	Yeah, so more of a predictive.
46.	IA	Yeah.
47.	RM	Ok, so apart from BI capabilities that we talked about, what else do you think is essential for the success of a data-driven organization?
48.	IA	It would be to have everybody in the organization involved. But also to know that is a continuous journey. It's not a goal. Where were you kind of end up at some point, you have a continuous work, you are never done, and also not to look too big at first, to look at what you have, and to see how that can gain value for your organization. It's also about the quick benefits. You need these tool. You don't need all. You don't only need a long term thing, because the quick benefits. When you test those, that is also when you get to failures, and so the quicker you get them to better do it, because then the quicker you get the knowledge. So it's more like continuous strides to make fact-based decisions, and the willingness to continuously improve.
49.	RM	Okay, what at the moment organization utilize when using BI? So for example, you have the descriptive,diagnosis, predictive perspective, the purposes is we want to understand where most organizations are at the moment, and why would you think that is the case?
50.	IA	I would say that most of organizations are at the point, as we previously mentioned, where they have a lot of data, and they don't, in house, they don't have like the capability to use the data fully. And also if you look at the market, the number of data scientists and that type of role is kind of a limited access, which makes everyone sit and wait. They don't want to take the big step, and everyone is talking about the big step like machine learning and AI, but they feel like they are not ready for that big of an investment, and then they kind of think that they can't be data-driven, or they can't start their journey to become data driven if they don't invest that type of money, and they don't have the budget for that at this point but still they want to do something with their data, but that makes them wait and not do anything, Because they think that is such a big step for them. But it doesn't have to be, like the start doesn't have to be stopping. That's where organizations are at. Almost organizations, of course, we have organizations that are more advanced and more improved. For example, Amazon that is a good example. They have come a long way, but they have also been kind of data-driven from the start. And they need to be, that is kind of their entire business. So, it's more of the perhaps older companies, and bigger companies that have, a bigger share kind of struggle. And of course, we always say think big and you will achieve big things. But to become a data-driven organization and to start with the journey, I would say think small.
51.	RM	So what processes or which processes of current BI systems are the most challenging at the moment? And why is that?

52.	IA	So, if I understand your question correctly, I would say the quality process.
53.	RM	Okay.
54.	IA	To have most data. The data that they can trust that they know is the correct one with a good quality to base decisions on. Because that is what I believe most companies are questioning, whether or not the data have good quality, good quality enough for them to base decisions on it. And of course, then they also need someone to work with quality of data. And if they have continuously just gather data, they wouldn't know anything about their quality. So data quality and also to build data warehouses, in order to have the data collected at one place and to have most of data.
55.	RM	Well, speaking of that data quality, do you think that can be a hindrance of organization to move to the next stage? And is there a way that organization should consider that could data quality be a continuous process, as you said, with all other activities of data driven?
56.	IA	Yes. It needs to be a continuous process. You need to have someone that works with your data quality and make sure that is of good quality. And of course it depends. Perhaps if you have a web page where you ask your customers to fill in first name, last name, email, phone, and everything like that. And in your database, you have this number, a huge number of unstructured data, because someone has left out their first name, someone has an incorrect email address, someone has a faulty phone number only contained in three numbers. Then you need to go back to the web page to limit the access on what they actually can write. Because what you see today is that most web pages actually have this little green thing when you have written a correct email address or a correct phone number. Other ways it tells you this is not a correct address or this is not quite phone number. Not everyone has that, but it's a good start to improve your data quality. And there is, of course, other way that you need to work with data quality as well. But that is just an example of how easy it actually could be to from here on forward. You can improve your quality by changing that source. So yes, I think that data quality is absolutely continuous work. And I also think that it is limiting knowledge that organizations can gain from their data. But if you're a good analyst or a good data scientist, you also would know that you can't expect to have like perfectly clean data within big organizations today. We have not come that far yet. So, if you then say this is my analysis, it is based on these type of issues that I found. I found that we don't have enough people swapping their card, because we don't have an incentive for that. So, there should probably be more customers included in this. But this is what we gain from our data. And if you say those things and are pretty clear on what you base your analysis on, then your analysis is still correct. Because you are informing about issues on the way, but that's kind of how we need to work today. Because clean data, I have never seen it.
57.	RM	True. So what do you think about employee skill set? How do employees skill set contribute to an organization data-drivenness? What kind of skill set are needed? And why do you think so?
58.	IA	I would say, again, back to everyone, cooperation within the organization. They all need to be open for change. That is an important skill set because change will come where knowledge will come. But otherwise, of course, there was always good to have analytical skill set. But we're all different people and not everyone can have that. That is why we have the tools. So we have some people managing the tools and then we have the tools to spread knowledge to others. And that is the knowledge

		that they can collect based on their specific knowledge. So I would say that to work together and for everyone to know how they work. It's the important skill set. And then of course, a few people or if you hire a consultant or anything, but mostly you need someone in the house as well to continue to work with. This comes down with time. You can have consultants something after tool or making those bigger things or starting up perhaps learning how to work with hypothesis driven testing. And then you can continue to work on your own as an organization. But you need to continue to work with it. So, it needs to be something that they're can be found in the house. That person can have different types of like rules, level. That doesn't matter. It could be someone working with something else as well. Perhaps in some companies is not one hundred percent role, but it needs to be there somewhere.
59.	RM	Okay. And for the analysts, do you think that it's important that they also have the business skills?
60.	IA	Yes, or no, not really. It's like, it's always good, to have one person with everything. But how easy is it to find that person. Then it's better to collect the team or persons, but together has all the needed knowledge. Because one person, even if he has all the knowledge, is only one person. And so you can kind of get the samething with the team. But then of course, it would probably be the scenario that they will have other tool, and they will work, and not only on this team, but on other things as well. Because if one person could do with one hundred percent, then if you divide it from three person, and of course, they don't get a hundred percent each.
61.	RM	Yeah. And in terms of analysts, do you think they should be centralized or distributed to different units? And what do you think are the pros and cons?
62.	IA	Oh, that is a really hard question. I would say that you need both.
63.	RM	Ok.
64.	IA	From my experience, both is the best, someone that is close to the organizations, and then that person will work with some certain sorts of analysis. The team that's more centralized, will work with a different type of analysis.
65.	RM	Okay, so for an organization to be successfully in being data-driven, what do you think is more important? Is it the right technology and tools or the right skill set and processes or the organization culture that supports data-drivenness?
66.	IA	The organization culture. Of course everyone is important, but if you don't have the culture where do you do to change, then it's impossible to do the change. And then you don't get anything of the benefits from the rest of that tools and such.
67.	RM	Would you like describe a data-driven culture?
68.	IA	Yeah, that would be like a culture that knows that they are on a continuous journey. And they also want to be on a continuous journey. They all have access to the knowledge on certain level. And they are striving to make fact-based decisions, and with the willingness to always like improve. So the thinking if you look at one person, it's good if that person always thinks about how their work can be improved, how can I work more effective? where is the issues in my role? Because to sit in the upper management, it's really hard to see those things. So you need to be helped, with that part, that I would say.

69.	RM	And what kind of support do you think is required from management for the success of data-driven organization?
70.	IA	I think the support of clarity, it's really good, and also really important, and that it is an open organization, they share, not the first floor second floor version that we talked about earlier. More that they interact and that they can share issues that happens within one part of the organization can be communicated. So even if it's a hard worker person, it needs to be connected someone to the management, for them to kind of hear and listen to what issues might exist within that role.
71.	RM	Do you think they could do some activities that could inspire data-drivenness? The management, could they do some activities? Like what could those activities be perhaps? Like, for example, some organizations would have like visualization screens all over, some would do like management talking and management doing by example, and some would put champions. So what do you think usually like in your experience with working with organization, what activities work best for organization?
72.	IA	And I would say that, what you said was fine, but it needs to be really communicated. So it's not just to send like an email with numbers and the craft or something to inform what's been going on. It's more of the closer work together that's needed. So of course, everything is good, like showing dashboard and such, but it's not enough. They need to have this initial start, because if the start goes bad, and I would say that they're thinking of this data driven or change is kind of bad. So if you give them the wrong impression from start, that won't be good for the continuous work.
73.	RM	So you're saying that for top management, leadership, it's important to communicate clearly?
74.	IA	Yeah. And you put a lot of energy into the start. Yeah, to have everyone aboard from the beginning, and not just to say, oh, here we have evolved a new dashboard for you, and then it will sit here on your office wall for you to look at the numbers every day. And then I would say, okay, but why should I look at that numbers? I don't know what the numbers are. Why are they for me? and that needs to be clarified, because if they get the negative point of view of it from the start, then it's really hard to break it to. Then we come back to this way, no we have always worked this way, why should we change.
75.	RM	Yeah, yeah, true, very true. Are you aware of the term fact-based culture?
76.	IA	The fact-based culture, that is kind of what we talk a bit on previously. It's kind of what the entire data driven organization is to me, to base decision on facts instead of intuition. But I will also raise the importance of not to delete the intuition. Those people are need too if something, data cannot tell you everything. That's something that people need to be aware of. It's not, it's not God. You need the intuition part as well. Because those people have worked with the type of things they work with, depending on organization. They have been working with those for a long, long time. Of course, intuition is not to be discard. But if you guys don't know how to set up a test, if you don't have any data to start with, then perhaps intuition can start you out and you can test if the intuition is right. And if you get failure, then you also get acknowledge, right? But if you get success, then you also get knowledge. And you most you get data. So, intuition is good. You should combine intuition with fact based. I would not only use face-based. I would say.

77.	RM	Okay. How can organizations ensure that their data strategy aligns with their business strategy?
78.	IA	I would say that data strategy should be based on the business strategy. A good way to work with that is to work with hypothesis. That is the line we can add with the business strategy. So you create hypothesis depending on the business strategy and what you think is true. And then you use the hypothesis to build the analytical strategy. That is what you test and what you want to find out.
79.	RM	Okay. In terms of organizations culture, data-driven, is it common for this organization to accept failure?
80.	IA	Yes and no. At the start, I would say, it could be quite negative to get failure, because you put money into the analysis, of course. And you see the failure is something bad. So it's a process for them to see the failure is also a sort of knowledge. So, I would say that is something that many needs to work on. For example, we take the design of a test, then it shouldn't be like a half a year process to design a test to answer a hypothesis, it should be something that you do quite quickly, in order to easy to gain, failure or success, because then you gained a knowledge much faster. And the time, that half year put in that is also money. So it's better to define something fast and get the knowledge fast.
81.	RM	Yes. So basically, what you're talking about, like for this developing hypothesis, it also involves challenging assumptions that always exists and also always looking for additional information.
82.	IA	Yeah, that is a really good point. Because most companies tend to not look at the things they think they know, they try to come up with new things, because the things that they think they know they see as the things they do know. But that is not the truth, because they haven't proven them at any point. But that needs to be done before they can come up with new things that they want to test. Because it's all about the limitation that we only test one thing at one time. Because otherwise, how can we make sure what impact the results?
83.	RM	Yes. And so just I think we are running out of time. So just we wanted to know do you think there are any other factors that are important to enable data-drivenness and we haven't covered in this interview?
84.	IA	I'm thinking. I think, one way we can say that it's important is to collect data throughout the entire process. If you have processes and you do like a test of specific part of the process. You should collect data for the entire process, because otherwise you perhaps gain an insight when doing the analysis and that insight leads to a new question, and that question can be answered too by data. And if you don't then have that data, you can't rerun the analysis. So it's better to think to collect more data when you do it, than to limit data collection itself. You can limit the time you have to like, construct a test, because you want to get quick results, but you should not limit what data you collect. So if you have the possibility to collect ten types of data, for example, then you should not say, we only collect six because we only need that six specific to answer this question. Because when you look at the analysis, new questions can arrive, and you can always find the answer in data. So if you have all the data, then you can come back and see new insights. For a test that I did, we tested one thing, but when we analyze the data, then we also found some other interesting point of view that we didn't think of before. And we said, oh, perhaps it could be a good thing for a new test. And then we had historical data to base

		the new test on, to really prove the new theory that we got. So you can always source data of the latest states. You can clean it out if there is data that you don't like or don't want. Ah, but you can't when you have done the testing part and the collection. You can't go back in time and collect more.
85.	RM	Yeah, true. And we just forgot to ask, I think you mentioned about it somehow somewhere, but we just want to be sure. In terms of user access for these BI systems, how should that be managed for that driven organization to be successful?
86.	IA	I think, again, like that depends. You shouldn't have access to somethings you don't need that. That was only complicated work. But it's also really important that you actually do have access to everything that you need, so that you're not limited. Sometimes they tend to forget that part. I got a new computer yesterday, and then I wasn't admin on my computer, so I had to call IT and they would open this window for me to install programs. And that window will be open one day. And I said, oh, but I can't have it like this time. It's impossible. Every time I download the new package for my analysis, I should have to call IT and ask them to open the window. You know, I can't do that. So then I had my manager to confirm that I should be admin on my computer, and I send an email to IT and then I suddenly was admin and like five minutes of time. So it's really important that people have the access that they need. Because limitation or feel to be limited. Ah, that is a big setback for a data-driven organization.
87.	RM	Very true. And we totally agree with you. Yeah. Thank you so much Isabelle. And sorry, we took more of your time.
88.	IA	It's no problem. I'm so glad I could help. I've been in your shoes. So I'm really glad that I could give you some input that is valuable to you.
89.	RM	Thanks a lot, and enjoy your day.
90.	IA	Yeah, you too. Bye!
91.	RM	Bye!

Appendix 4: Interview Transcript [Rsp3]

Date: 10:00, 14th of May, 2018

Duration: 42 minutes

Interview format: Phone call

Transcribed by: Qinyan Ye

Transcription checked by: Robi Morro

Transcription date: 14th of May 2018

Researcher 1: Robi Morro: RM

Researcher 2: Qinyan Ye: RM

Interviewee: Johan Rastenberger: JR

Company: HoneyBI

Row	Speaker	Text
1.	RM	As we said earlier, we would like to understand about that data-driven organizations and the about the processes and what kind of system they should acquire. And we thought that talking to a consultant company that helps organization become data-driven will be quite helpful for us to understand this study on another perspective.
2.	JR	Yeah, for sure I understand. Yeah we have offices in in Gothenburg on the Linköping in the middle. And we are quite a young company actually been running for six months. Right now, we are for seven consultants helping organizations and supporting them in their BI journey so to say and integrating different systems to combine their data in the structure way.
3.	RM	Okay that's sounds good, would be nice to hear what you have to say. And just before we start officially we would like to ensure you that this interview will be handled with confidentiality and also, is it ok that your name and your company name appear in our paper?
4.	JR	Okay.
5.	RM	And is it ok that we record your conversation?
6.	JR	No problem we can do that
7.	RM	So if we can start with the first question. Can you please briefly describe about HoneyBI and your current responsibilities and experience with business intelligence?
8.	JR	Yeah we are consultancy firm focusing on business intelligence and we are independent when it comes to different technologies. I should say we are one

		of the best companies in Sweden when it comes to SAP business intelligence tools like Web intelligence, Lumira and Design studio and for sure also analytics cloud but we can also do assignments within power BI, within Microsoft environment some Tableau and Qlik as well. But we are independent when it comes to technologies. We are as I said quite a young company we've been running for six months and we are currently seven consultants, very senior consultants working for twenty to twenty-five years experience within business intelligence and we help companies actually getting better insight and receiving better results. That is our idea on how to actually support and help the companies in the market. We operate with two offices, one office in Gothenburg and one in Linköping, and we have customers in different industries, from governments, hospitals, to supply chain companies, and consultant companies. Today we have about twenty active running companies right now. And my responsibilities, I am the founder of HoneyBI, and I am the CEO as well. I've been within the finance sector for a long time and thought it would be really interesting market, the data is increasing all the time and companies what I've seen is really struggling to console data, to take control of the model and need help and support with the BI system.
9.	RM	Yeah, thank you for that. And so how do you understand the team "data-driven organization" in your own opinion?
10.	JR	Well, I think data-driven organization is an organization that are aware of it's information everywhere in the organization. And the company actually takes control of the data flow within the organization.
11.	RM	Okay. Do you think there's a difference between data-driven, analytics-driven, and insight-driven?
12.	JR	Well it is different areas I should say within business intelligence. And it is very different between different industries. So I think yeah, I think there is a difference between data-driven, analytics-driven, and insight-driven, but I think most of the companies are still perhaps not that analytics-driven or insight-driven, they are just focusing on being data-driven, actually taking control of the data within the organization.
13.	RM	So by that you mean that they just make sure that they have the right data?
14.	JR	Yeah they are just happy that they have the data in some way consolidated for decision making, but they have not the time to spend on actually going the full potential of being data and analytics or predictive or insight-driven. They are just happy to be running with the data.
15.	RM	Okay, that's quite interesting to know. Maybe we'll come to that question later. In your experience, what are the motives behind for organizations to become data-driven?
16.	JR	To increase results and to be more efficient.
17.	RM	Okay. In our understanding, having the right technologies and tools and abilities are the key aspects of a data-driven organization. Do you think companies are interested in deploying the right technology and hiring the right people or training for the right skills?

18.	JR	I'm not really sure the technologies are the boundary. I'm more think that the model and finding the right employees really can push the organization taking the investments for being data-driven. I think that is the most important thing actually, to have the management that really see data and structured data as a competitive edge within the company. That's what I see when talking to companies that it's very much of the leadership and management perspective working in data-driven.
19.	RM	Okay. What do you mean by a model driven?
20.	JR	I mean if you don't have a clear opinion in your organization on how to calculate some of KPIs or how the business models really acting about the triggers really are for being more efficient and having better results, then it's quite difficult to work in a data-driven way within an organization.
21.	RM	That's very true. So I mean that's basically that means you need the right business strategy that supports data-driven.
22.	JR	Yes that's what I mean.
23.	RM	Ok, i'm not sure if you've answered question number six. I think that's more like what we discussed like a platform, technologies tools and right skill sets. I think we talked about that management. Would you like to add some more?
24.	JR	I think, this topic involves the whole company. And from history perspective, the IT department has been short for collecting information, supporting the system and applications within the company. But there is a change for more interacting with market, with finance, with ongoing operations. And I think a every successful factor is that those different parts of the company interacts with each other. There is a clear leadership and a clear responsibility when it comes to the business intelligence strategy and actually the data as well. And that is something what I see that a lot of companies are struggling with right now.
25.	RM	Okay. When it comes to technologies and tools, how are technologies and tools affect data-drivenness of an organization? For example, all the factors, like the management is right, and then you have the strategies, how would then the technology play a part to make it happen?
26.	JR	I think the technologies and the tools they need to be fast to implement, you need to have a proof of concept quite fast in the project. I think that the business models, the suppliers of the technologies and tools use a lot of upfront license cost structure have investments for introducing and implementing the technology, more clouds solutions, more pay as you go, what you actually consume what you need is the way forward for the suppliers of the technologies and tools, and that is very important for actually increase the data-drivenness in organizations
27.	RM	Okay. Do you think also they should consider the end user, for example, should they be easier to use or easy to grasp?
28.	JR	Yeah. Well, I think most of the technologies are quite well, you don't need to be always a high skilled technicians to actually build easy graph for a

		dashboard within the different systems. But for sure you need to have a project that involve the end users in all the stages, absolutely.
29.	RM	Okay. Proceeding to the next question, what in your opinion are essential BI capabilities an organization need to enable data-drivenness? and what are the complementing tools needed?
30.	JR	Well you need quite a strong database actually. In the first you need to have a data warehouse structure where you consolidate ETL processes where you extract and load the data into the data warehouse. And you need to have the transformation where you make a logic between the data layer or the data warehouse to be able to have a good performance. Because performance is really essential for them when it comes to consuming the data in the front end system.
31.	RM	Do you think when you have all these things, would this ensure data quality?
32.	JR	Yes, it will. I mean in the backend, in a solution, it's very technical. And when you have a good solid front end, but that's when you really see the benefits for the end users and they starting actually taking better decisions uh, day by day.
33.	RM	So, research shows that one of the BI capability is that's important is that BI systems should be integrated with other systems in organization. Do you think that's important for a data driven organization or they can actually do it without integrating BI systems?
34.	JR	Well, I think personally that the integration with different systems is one of the key factors for a successful business intelligence project. If you have sales data for a CRM System that you're aware that users consume this data on a daily basis then for sure it should be integrated together with the information from quality or from ERP system or HR system or whatever. It all depends on the business and what the decision makers really need to see and act on.
35.	RM	Okay, the next question, what kind of analytics do most organization utilize when using BI? We touched on this initially when you talked about data-driven and analytics-driven.
36.	JR	Yeah, I think right now I think it's much descriptive and diagnostic, but a lot of companies are trying to work more predictive and prescriptive. But they are starting up that work right now because the tools has not been that sophisticated yet. But that is something that it goes quite quickly right now.
37.	RM	Well, what do you mean that the tools are not sophisticated? Is it there are no available tools to enable prescriptive and predictive?
38.	JR	Yeah, it's been very expensive and its only the largest enterprise and companies that actually could afford in the past. But right now, we can see predictive tools more easily to implement, more easily to use, and not that heavy investment. And therefore, I think the increase of predictive analysis and business intelligence will increase going forward.

39.	RM	In your opinion, which processes of current BI systems are the most challenging? And why do you think so?
40.	JR	It is the data validation within the data warehouse to actually agree within the organization on the calculation to make sure that the data is correct from different systems. I know that correctly. That is the most challenging.
41.	RM	Okay. And the next question, in our knowledge, data is the key to data-driven organizations. How does that affect the organizations data-drivenness or the lack of it? And what are the challenges the organizations face when it comes to data?
42.	JR	Yeah, I mean I really think that most organizations, they have applications a lot of applications within the organization, and actually deciding on the governance model where you have the master data and who is responsible and for the data and the process, that is the most challenging for the organizations.
43.	RM	And In your opinion, how should data stored in an organization? Should it be centralized or decentralized? And why?
44.	JR	It should be centralized. It should be under the controlled by some kind of centralized department that can take the full responsibility for the data. And I think that a lot of GDPR and a lot of legislation right now, is going that direction right now, need to be controlled and managed in a better way, perhaps than it was done in the past.
45.	RM	And what about access? How should it be distributed?
46.	JR	Yeah, I mean it's on a role model. If you are a sales manager then you should have access to information which is relevant for you. If you're in production, you should in that kind of rolled on access that kind of data. So it's more role-based access model.
47.	RM	Yes, it makes sense. So research would claim that data quality is critical for a data-driven organization. What is your opinion about it?
48.	JR	I fully agree. I mean, we need to have data quality for taking right decisions. And if the data quality is poor, then people and users will not rely on the data and then they will not use the tool for the business intelligence solution.
49.	RM	What does it mean to you by data quality? If I may add.
50.	JR	That is correct, that is up to date, that is validated, and someone has actually approved saying this is the correct data from this system into the database.
51.	RM	Okay. I'm just looking at, we have gone for twenty two minutes now. Is it okay that we extend that time?
52.	JR	Yeah, for sure, no problem.

53.	RM	Okay. Thank you very much. We proceed with the next question. In general, how do employees skill set contribute to an organization data-driven? What kind of skill set are needed, and why?
54.	JR	That is quite difficult to answer. The employees need to be open for information. They need to have mindset that actually is saying that we are open for new information and looking into new directions for better decisions. It's very much culture, I think it's very much a culture and leadership.
55.	RM	Ok. And we will come to talk about instilling data-driven culture, we will come to questions like that later. And for analysts, what skills are required? Is it important that they have also not only the technical skills, but also the business acumen?
56.	JR	Yeah. If you're a business intelligent analysts, you need to be curious about the clients or the company's business model. You need to understand what the business model are, and then you can build technical solutions that really helps and support. But it's we are working that it's more important for our consultants to have the business acumen and more like, the senior business advisor that is to be on the technical part, because the technical part we have the knowledge, but it's more difficult for us to actually finding this management consultants.
57.	RM	Ok. That's quite interesting. So you think that actually the business acumen is more important than the technical side?
58.	JR	Yes, it is because that from our part we are trying to sell our services. If we only talk about the technical parts then we will not receive any orders at all. We need to be in very much involved in the client's business.
59.	RM	So would you say that will be the same for example for like a team of analysts in an organization, they probably need to understand about the business so they can actually build better models for the businesses.
60.	JR	Yes, exactly. I think it's very helpful and very important that you have that kind of skill.
61.	RM	Okay. Should the analysts be centralized or distributed to different units? What do you think are the pros and cons for both?
62.	JR	I think within some very large corporations, I think that could be distributed on different units, but it's really large corporations. In small and medium sized corporations, I think they should be centralized to be efficient and in some way cost saving as well.
63.	RM	Okay. And in case of the business users, what is your opinion on whether they should have knowledge on how to work with data and BI applications or they should rely on IT and data analysts for that. So now we are talking about the other side. So the technical side should have business argument. Now the business side, should they have a little bit of technical skill.
64.	JR	I think that they should not be that technical, they should rely on the data analyst, but they should also rely on business controllers who have a little bit deeper understanding than the normal business users. But they shouldn't be

		that self-service, so to say from the BI perspective, they need to rely on the data analyst or the BI department.
65.	RM	OK, so why do you think that self-service is not really the best option?
66.	JR	Because I think in many organizations, it is not that mature yet. Self-Service will increase, but then users are not that highly skilled that they can actually take command of the tools yet. But yeah, in the long run, yes, I will for sure see an increase of self-service, but we are not there yet.
67.	RM	OK, does the level of knowledge of business users and how to work with BI applications directly affect data-drivenness of an organization and the ability to make data-driven business decisions?
68.	JR	Yes, I think so. I think that the business users could for sure affect data-drivenness, and if they see the benefits, they will take better decisions, and I see the relation in that one.
69.	RM	Okay. How should users be involved in the implementation of business analytics, new technologies and systems? I mean like for example, there's a project going on, the company wants to deploy a BI system, should they involve users to get their requirements?
70.	JR	Yeah, very important. The best way is to do a proof of concept, a small prototype within a small area and that project should involve end users to get their opinion on what is actually needed for taking better decisions, very important to involve end users.
71.	RM	Ok, for an organization to be successful in being data-driven. What is more important? Is it the right, I think we talked about this year, you cover this earlier um, about yeah, you talked about management is very important, but maybe we can talk about how do you think they influence each other. Skill set, the leadership, and the technology, if it's possible to answer.
72.	JR	Yeah, I think we discussed this a little bit, but a very key factor for success is the management team. And if they show the organization on how they use information system and business intelligence to them, and then other managers will start using it, and then you become more and more data driven. But if you still accept that you have a lot of excel sheets running around the organization, you use powerpoint , you use other tools for consuming data, where you actually know that this is not hundred percent data validated, then you will not increase the data-driven culture within organizations. So I think the key factor is the management and leadership that show a good example.
73.	RM	Okay, so I believe that could be one of the support that's required from management. Could you foresee other support that is required for them? I'm jumping to question number twenty-three.
74.	JR	Yes, I mean, you need to find the tools which are the best for your organization. And you need to make quite expensive check in, and pre-project for actually deciding which is the most cost efficient tool, which is the tool that helps us the best. And then you will probably get a good BI solution for the organization. And you need to involve a lot of competence in this decision upon the end users, you need to have the finance, you need to have IT, you

		need to have probably experts in building data warehouse structure integrating different systems into the data warehouse, you need to push a lot for performance. I think performance is really important, it needs to be fast when you consume the data.
75.	RM	Okay, so basically what you're describing is the management support and sponsorship for the BI projects. Is that correct? So if the management is fully involved in the sponsors and supports the BI projects, then it's more likely to work.
76.	JR	Yeah.
77.	RM	OK. I think I would combine question number twenty-two and number twenty-four. How can organizations ensure that the employees are data-driven? And can you also describe a driven culture? Because I think that those two are related.
78.	JR	Yes. If you make business intelligence solutions and support the end users by really good reports, dashboards, or other things that helps you in your daily business, then you will become data driven. So you need to show the good examples, and in the beginning of the BI project, build examples where you make manual work digital and data-driven.
79.	RM	Okay. So that would basically be a data driven culture because the employees would see dashboards, visual dashboards, they will see changing processes. That's basically that a driven culture. Is that correct?
80.	JR	Correct. And it's not only for finance figures, it could be operational figures, as we said before, it is the use of quality figures within the whole organization and different areas.
81.	RM	Okay. Which strategies have proved successful in promoting a driven culture in organizations? I think that's the basically what you answered maybe?
82.	JR	We discussed the support from the management team, to lead by good examples, showing usage from the top down perspective down in the organization. I think that you should find some so really good promoters within the organization that are really supporting the project, are able to talk to end users in their language, not only from the project perspective, that is really important as well.
83.	RM	Okay. I think you've actually answered question number twenty-six and number twenty-seven also about the champions that should promote data-drivenness. And in terms of projects, what do you think IT and business's role in initiating a project? What push should come from, is it more from IT, or is it more from business departments?
84.	JR	It should be for the business department, they take the decisions, they are responsible for the results of the efficiencies, so they should be the one push the projects to be initiated, and then for sure the IT department is very important for the for making it happen. But it should be initiated from the business side.

85.	RM	Okay. How can organizations ensure that analytic strategy aligns with the business strategy?
86.	JR	That is by having clear targets and having a good understanding of the business models and business objectives
87.	RM	Are you aware of the term of fact-based culture?
88.	QY	When talking about fact-based culture: for example, a company encourage their employees to do some test or trying, for example, when they cannot agree on something. They have some infrastructure for them to perform A/B test or something like that.
89.	JR	Fact-based culture, I think I can understand it. I see the logic. If you have facts and you take decisions on the facts, they need to be correct. Absolutely. So for sure, I think that business intelligence solutions, business intelligence strategies could support the fact based culture then. But I'm not that aware of the term fact-based culture. But I think it's in line with what we are discussing now ,it probably will increase the fact-based culture, having a big business intelligence solution.
90.	RM	In organizations currently employing BI system, is it popular that one can always ask for additional information or challenge assumptions? That's basically also factor of fact-based culture.
91.	JR	Yeah, I mean what we see if you show good benefits and you show good solution for one problem, that will start discussing in the organization and requirements will come and they will ask more. So yeah, most likely.
92.	RM	And what are the obstacles if any, preventing most companies to transform being data driven in your experience?
93.	JR	Yeah, it is the history of the organization and the culture. And I don't think that technical obstacles are that big, but many people are still in very problematic and difficult system environments. And they need to take control of most data to be able to more data driven. That is the biggest obstacle what I see.
94.	RM	And after advising customers on BI applications and tools to use, how do you ensure they achieve a positive result out of it? This is for your consultant point of view.
95.	JR	Yeah, we measure the quality, and we make sure how their use the reports or showed dashboards within the organizations. So we follow the trends. They actually use what we have produced.
96.	RM	Okay, so you also data-driven in that way.
97.	JR	Yeah, supplier you can say that we are data-driven inductor and we make sure that clients in their own business intelligence solution have capabilities of actually make sure that they managed the business intelligence solution in a good way. If its failed reports or reports that are not used for a longer period, if they need to push something, because they think that this is really

		benefit for some kind of users in the organization, they need to push it harder. So that is something that we can help with as a supplier.
98.	RM	Okay. And the last question is in terms of data-driven organizations, are there any factors that you think that are important to enable data-drivenness and we haven't discovered them in our questions.
99.	JR	Okay, I think this is not to be able to work, this data-driven, it's not a quick fix, it is culture and mindset shift needs to take place in the organization, and I think that it will take some time depending on the current situation at the client and their own skills. So I really think it takes actually longer time than you perhaps think the first time when you start discussing.
100.	RM	Yes. So it's actually a journey that organizations need to go through.
101.	JR	Yeah, exactly. It's a journey. I don't think you can say we are hundred percent data-driven within our organization. You need always to always discuss, you can always do something more. It's more of a journey and behaviour.
102.	RM	Okay. Well thank you so much Peter.
103.	JR	Yeah, thank you. Hope it will be some kind of help for you.
104.	RM	Very helpful. We really appreciate your time and your responses.
105.	JR	Yeah, thank you. And have a nice day.
106.	RM	Thank you. Have a nice day.
107.	JR	Bye!
108.	RM	Bye!

Appendix 5: Interview Transcript [Rsp4]

Date: 11:00, 16th of May, 2018

Duration: 59 minutes

Interview format: Face-to face

Transcribed by: Robi Morro

Transcription checked by: Qinyan Ye

Transcription date: 16th of May, 2018

Researcher 1: Robi Morro: RM

Researcher 2: Qinyan Ye: QY

Interviewee: Justhy Prasad: JP

Company: Clarity Square Technology

Row	Speaker	Text
1.	RM	Can you briefly tell us a bit about your organization, your current responsibilities and your experience with BI.
2.	JP	My organisation, I founded something called The data strategy lab in Switzerland. And that's a division of this company, which is Clarity square technology. And I do consulting services to various institutions globally, governments and different organizations.
3.	RM	Okay
4.	JP	And my current responsibility is to enable traditional companies transition into becoming data-driven, through data and people related strategies. So that's my main goal. I even lecture, I teach, I speak and write on this specific topic, now although for me, BI is a very, very narrow domain, within a much wider the topic, which is data.
5.	RM	Ok, Why do you think so maybe?,
6.	JP	It is a fact. So if you can give me a pen. So I would want you to check up on something which is called Dama framework. Where you would notice a wide range of, I think about ten to twelve data related topics, BI is one aspect, okay, so you'll be able to put that into the context of what exactly you're trying to do. Because I don't know much about what you're getting at. I just want to make it clear to you that within a very wide topic called data and business intelligence happens to be one part of it, a very small part of it.

		My experience with BI, I've been doing the data related role since 1998. I started in the UK then, I've consulted globally, uh, including as an expert for IBM labs in Dublin. So like I said BI, in my viewpoint, uh, I call this a scale, again, you will find this in the writting. Ability to act on data vs inability to act on data.
7.	RM	Yes.
8.	JP	So inability to act on data to ability to act on data. Ok, so that's the spectrum. So an example that I usually take is like, you know, California forest fires. Right? Again, if you take the Scientific American article which I sent you, that's America's inability to act on data in addressing the four point three trillion dollar infrastructure deficit. Right
9.	RM	Yes
10.	JP	Data is saying you have to do this, but you are not able to act on it. So that's your inability to act on data, which is much more expensive, uh, than the problem that it creates. Right?
11.	RM	I agree.
12.	JP	So this is not an issue of tools and technologies. It's an issue of people and processes to ensure that it happens. Okay. So, uh, BI in itself is not per se, just a tool domain, it's not business objects, visualization blah blah blah. It's a zoo. You have thousands of applications. You have thousands of BI tools. If you go and search and look for Gartner for example, you know Gartner?
13.	RM & QY	yes, we do.
14.	RM	They even have uh, business analytics framework.
15.	JP	So data driven organization in my view point: is an organization which is best placed to act on data. Because companies that do are higher in valuation than companies that don't. A classic example that I always use is Paypal, which was founded in 2000 or so, is more valuable than Credit suisse, which was founded in eighteen hundreds, more valuable than American express, more valuable than Jp Morgan, right? This is a classic case of a data driven organization and the benefits that it's getting.
16.	RM	Is there a resource where we can find this report that is saying that Paypal is more valuable than?
17.	JP	I said I gave you the book, It's all there in the book. And a lot of other companies also which I demonstrate and say that all these companies have used data, which is why they are more valuable. These companies don't use data and they are not that valuable.
18.	RM	Okay, yeah. So there is a comparison, then you can see the scale.
19.	JP	Yes. Ok. So this is primarily what I am actually teaching also, for example, Chief people officer, Human resources directors, they're they're kind of preparing for the digital age, right? Because till now we had the traditional industries. Now suddenly

		everything is changing. Now the question they have is, ok, what competences do we need for the digital age? So what I am proposing through my writing and all my work is we need to maximize the digital age. Because you have the data, you have everything. But if you're not double act, then there's a fundamental problem there.
20.	RM	And why do you think companies do not act on data, even though they have?
21.	JP	It's competences that have aged. That means see, we grew up, we came from an industrial age, right? We had coal, machines, industry, coming up. How does it work? So data was never a concentration, right? So let's say you want to check the temperature of a furnace. You check the thermometer. You know what to do. Beyond a certain point, steam is coming. You have to do something. Now let's say you're running a business. Let's say you're a CEO of a company, right? Your data tells that if you don't add new products in six months, uh, are you going to go bust. Right? Uh, but it's not the same as the furnace. You know the furnace is going to explode if you don't care. Business is what happens, you will not know. Now, what happened to Nokia.
22.	RM	It's a classic example.
23.	JP	So, like that, you have four hundred plus companies that disappeared for the fortune 500 list since 1995.
24.	RM	Well, because they did not act on data.
25.	JP	Because they didn't have to do that, right? Many companies are still in that limbo. Including many companies which are still having gone through that same struggle because they are not. So you can't smell data, you don't feel the heat, all right?
26.	RM	So it's easier to ignore it.
27.	JP	The only sense that we have on data today is visual. We only see data, we only see the red, green, blue, or colors. That's why you have data visualization. You don't have data auditorization. You don't have data on factory, you don't smell data, you don't taste it. So let's say the Hawaii volcano. And let's say you're a resident, if the data six months ago comes and throws lava on your face, what would you do? You would do something as opposed to just looking at the outcome that it is going to erupt. So that's kind of what I'm getting at here, that we are not used to behaving or responding to data yet, until events happen. So same thing with hurricanes, hurricane Katrina, hurricane Harvey, urban floodings, dam failure, do you know, Orevil dam failure? Have you heard of that?
28.	RM	No, which one, is it in the state?
29.	JP	In California yeah. So there's a dam failure that happened in 2003 or so. The engineers, when they check the exact spot where the dam is going to fail, nobody did anything. They knew where it was going to fail. They knew exactly the spot where it was going to fail. And 2017, February, the dam failed!
30.	RM	Oh my, how long did it take for it for this to happen? How many years?

31.	JP	2003 or 2005, 2006, you can count, ten years, exactly the same spot! So it's not that an organisation doesn't have intelligence. The organization has intelligence. It has the exact data to say, what would happen, okay, you would have reports coming in, if you're a chief engineer, you're gonna know exactly what's going to happen. But what you do with that information is what matters. So what you're getting at is that data driven organization has the ability to act on data. And a classic example of this is amazon. So Amazon is very very good in managing their data. So, which is why their financial value is ten times more than a company founded even in eighteen hundreds. That's the reason. And that's because there are data driven. That means now the question is what is, what does it mean to be data driven? Yes. Now again, you'll get all the detail in in my book. So to be data driven is to be person driven, person centric. To be data centric, it means to be a person centric. That means you will have the details of every person involved in that business.
32.	RM	Wow, that's that's a new insight.
33.	JP	So if you're getting all the product information in Ikea, I wouldn't take IKEA. Let's say you're getting all the product information in Walmart, right? You're excellent. You have like a million products. You have details of every product on the planet in Walmart, including the colour, the taste, the texture, everything. But you have nothing on a customer, zero. Does it help? No, no. So my point, the reason I call this the billion dollar bite, is the most important thing, the most important data on the planet right now is about data about people, us, this will be your data, my data, right? That's the most valuable thing. So if we can't take care of that, nothing else matters.
34.	RM	So, um, when you talk about people, you mean not the people working in your organization, but rather the people that you're serving?
35.	JP	It's the involved person, it's called involve person. So when you say involved person, that means your employees, your customers, your partners, your suppliers, everybody who's involved in the business ecosystem need to be taken care of. So in that book, you will also find a business model of data, you know, business models?
36.	RM	Yes.
37.	JP	So you will also find a business model of data, who are the ones who will be involved. So let's say that's a running a hotel. Who would be your involved person?
38.	RM	Um, um, hotel manager, you have receptionist, cleaners, um, people take care of the property.
39.	JP	Customers, transport, logistic, laundry, all these people. So now fundamentally, data is a reflection of a process. The process is a reflection of a business model. Yeah, the business model, if a reflection of a business strategy and a business strategy come from the boardroom usually, or the shareholders. So that's the link. So if you just have BI without people and everything else, your ability to act on data is low. So that's the point, right?

40.	RM	So what are the motives behind organizations to become data driven?
41.	JP	So my point is, and I'm fighting for this. I'm saying good profit, not just profit, good profit in the sense that when you make a profit, it should serve the society which would serve the world. Even a drug peddler makes a profit. But that doesn't help. So you need to make good profit. That's serves the society serves everybody in a more ecosystem, so that you're able to create something that's a lot more valuable. Right? So like I said, BI is an enabler only. So it gives you the ability to capture the data. It's called data acquisition. It gives you the ability to transform data, enrich data and ultimate publish the data so that you can supply it to the key decision makers to take an action. So BI is worthless if it is not actionable, right?
42.	RM	True. According to research, the technical BI the capabilities can be such as data quality, integration of BI with other systems and user access. What is your view on these capabilities in enabling data-driven organisations? How important are they?
43.	JP	Let's say the data quality. I've given you an example of the dam. Now, if the data quality was poor, uh, maybe the government or the federal authorities would have had a conclusion that it's not this dam, that's going to fail. It's that dam, right? So there's a cost to data quality, but it's a relative cost in the sense that, uh, the most important data has to be of the highest quality. That means for me the most valuable data is person centric data, data of the people. Let's say if I'm an engineer, I am the engineer who's checking the quality of the soil in this dam, checking the quality of the soil in this other dam. If my data is wrong, yeah, then you will not be able to do that. Let's say my name is Rob. Rob did a check here. He did a check there and Rob is saying that this is in trouble. If my information is not right, this is in trouble, this is not in trouble, but there's no Rob who's going to act? Who's going to find out what decision to take? You know, this dam is failing. but no person involved who is going to act.
44.	RM	You have to act as an organization.
45.	JP	How? organizations or people. Right? Let's say you're the governor of California, Arnold Schwarzenegger. How will you know that Rob has checked and said this dam is failing or the dam is fine?
46.	RM	Um, through reports, but then those reports have to be…
47.	JP	…accountable where somebody needs to own it. Somebody needs to be responsible. Now when nobody is, then it's I don't know ,I don't know that failed, I don't know. That's what it is.
48.	RM	Uh, so if I got you correctly, so they should be people taking accountability of uh,
49.	JP	People are the most important core in the wheel of life. Fundamentally, people are the most important, uh, actors in any process. And if the quality of data of people is weak, the quality of the process is weak.
50.	RM	So that means the if the qualities of the process is weak, that means these people are not really well trained or they lack certain skills?

51.	JP	That could be potentially few reasons, but they could be a lot more reasons than that. So the data quality is a relative term. That's what I'm trying to get at. For example, uh, let's say you are a company of consumer electricals. That means your company supplies fridge, TV, all electrical appliance. And let's say you have sim cards or rfids and all your equipment. And you are constantly collecting all this information into your database. Let's say twenty-four, seven, three, sixty five days. Right? There are loads of data. There you're not going to be too worried with the quality of data if it is poor there. Right? Like you have billions of data records coming in and five ten percent of quality here and there it's ok, right? But you're employee data, Um, are you ok to have ten percent quality? No, right. Your customer data. Are you okay with one-person quality laps? That's the point. You get it.
52.	RM	Yes, it depends on what that data is intended for.
53.	JP	Exactly. So the book in the book again, you have this very, very detailed saying that uh, the value of the data is as valuable as the process, um, as an involved process in the business.
54.	RM	Okay. Okay.
55.	JP	So I've just given you the example of this consumer electrical company. Right? So if customers involved in the same data. So now you have all this equipment, fridge, TV, and all this data. And now you have a customers' information there. Now, will you agree to let go of ten percent quality drop in data? No, you see that. So you see that when people are involved, then you start to see a value. Now this is valuable. If not, It's not valuable. Same thing with the dam. You're getting all the sensor data, Rob's name is not in that, you don't care. Suddenly Rob's name is there, wow, I need to look at it, right? That's what it is. So does it help?
56.	RM	The integration of business intelligence with other systems,
57.	JP	Like I said the example the consumer electricals, they're different systems. Fridge is a different system. Television is a different system. Let's say your fire alarm is a different system. Your electrical system is a different system. All these usually tends to come into one database. Let's say, let's say that only the equipment data is in one database, right? Your customer data will be in a different CRM system. Right? Your employee data will be in the HR data. Unless these are all integrated together, then it's useless. So integration is very, very important again, there in the book, you have a framework which says the importance of all these things.
58.	JP	Okay? You're comfortable with this?
59.	RM	Yes
60.	QY	User access?
61.	JP	Yes, yes, user access is very important right now because uh, person centric data is the most important, the most valuable, as well as the most sensitive, most sensitive. That means: Are you guys ok with publishing your home address at Helsingborg station?,

62.	RM	No
63.	JP	That's sensitivity. Yeah, right there. Now, I let's say you have this, you're running this equipment company and you are a customer data, and this customer takes your things and put your address on times square in new york. Are you ok with that? You know that is sensitivity, right? So that's why I call it the billion-dollar bite. Nothing is more important than that. So if you're not taking care of this, you're just wasting it. You're missing out. In fact, I'll let your a secret. My next book is gonna be called the trillion dollar bite, which is to say how governments need to manage the data because that's more precious, more valuable.
64.	QY	So let's say we are considering the access of people, for example, inside the organization how do you decide?
65.	JP	Depending on the relevance, depending on the process. So let's say in this consumer electrical company, let's say you're responsible for manufacturing. You need the data of suppliers. You don't need the data of customers. Let's say your marketing and sales, you don't need the data of suppliers. You need the data of people customers. So user access has to be allocated according. So that's based on the business process, the relevance of the business process. And the involved actors. So, you only need to see the data that's relevant to you to make your decisions. If you are finance you may need both. If you're some department, let's say you're the company board, you need both. You need to see both. So you need to decide relevant data to be available based on the need basis. Okay? How does data or you're okay with fifth?
66.	QY & RM	Uh, yes.
67.	JP	How does data affect an organisation to be data-driven or lack of it? What are the challenges do organisations face when it comes to data?
68.	RM	I think we have already covered this. From what sources should organizations collect data? How should they manage these multiple sources and decide what data to collect and measure?
69.	JP	Ok, so in this basic concept that I always refer to this, which I've already given you, business strategy is reflected in the business model, reflects in the business process, reflects data, and where does data come from? Systems and applications. So, um, whichever process you're interested in, um, you need to capture the involved systems in that process. Let's say you're running sales and marketing in a company or let's say you're the human resources in that country. So you will be interested in the processes of recruitment, retention, training and development of people. Let us say you are the Finance director, you will be interested in the sales orders, dispatches, financials, general lager, that kind of data. So, you may not be necessarily interested in human resources of people data. So, the process is divided within the systems like based on the process. Okay?
70.	JP	How should they manage these multiple sources and decide what data to collect and measure?

		So, depending on the process, you slice and dice your requirement. Yes. So, if you're running, let's say a hotel, and you want to understand the guest profile, you will depend on the front office systems, For example. If you want to understand your inventory, you rely on the back of the systems. So depending on the process, you will choose your data sources.
71.	RM	So I think we've answered number eight (With regards to user access when it comes to BI systems, how should access be distributed? Should access to data be limited to subject expert or distributed to the whole organisation?)
72.	JP	What is your view on the flexibility of BI? Do you think flexibility is one of the important factors to consider? Now, I don't know what you mean by flexibility here.
73.	RM	I think we have defined it. It's the organizational capability of BI to provide decision support when variations exist in business processes, technology or the business environment in general.
74.	JP	Of course. So in that, uh, again, in the book, there is something which I call the in class ODS. You know, operational data store. Data stores. So when you talk about business intelligence, there are various characteristics of data repositories. You would have heard of a data mart. You'd heard of the data warehouse. You're ahead of a data lake, for example. Provisioning of BI capabilities is not an issue today. If you want to give BI capability, every business has BI capability today. Even a street vendor has BI capability today. Right? Let's say he's running a google website. Google will give you google apps for BI, right. You have data marts available. You get reports not like before. Now everybody, you got you got a facebook, you have your own reports, right? For example. So today BI access ability is not a problem. In fact, you have an old law of it. So let's say if you're running the company or you're working in some company, you're overloaded with choice. You have thousands of tools. Literally. I mean to say really thousands. If you're in a bank, you have thousands of applications, thousands of applications. Which one do you choose? So flexibility is one important thing, Yes, certainly that's a given. Governance becomes more important. Okay, governance is more important today
75.	RM	In which way?
76.	JP	Data governance, for example. So you heard of GDPR are right, right, which is due end of this month, twenty seven of May. Right? So you have lots of BI tools, but what do you do with those tools is more important. So that's governance. That means let’s say you have a report that report comes later on the tenth of May. What happens on the eleventh of May is more important than the report coming on the tenth of May. So what action is taken on the eleventh of May based on the report coming on tenth is more important. Ok, so flexibility, I don't know what exactly your meaning by it, but uh, I don't think flexibility per se is an issue. I think governance is important to ensure that certain outcomes are driven like your ability to act on data. is not flexibility in the sense that this Rob in the dam has the data.

		Flexibility is not an issue there. But what they do with the data is important. Right? So I don't really don't know what you're uh addressing. But um,
77.	RM	I think what we are addressing is um, having when organization get this BI processes, this BI I mean BI system should be able to um, be changed according to changes in organization processes. So should people be changed and follow how the system is designed? Or should the system be designed in such a way it can be changed when the business changes.
78.	JP	Ok, so I think I get what you're saying. So let's say, process 1, process 2, process 3, process 4, process n, business is having a number of processes. So let's say one process has to change. So with the BI system, it always has to be resilient. Flexibility is a given, but resilient is more important in the sense that its ability to sustain change.
79.	JP	Of course, definitely point number eleven (People, processes, technology and external events can present risks to an organization. In your opinion do you think BI can assist organizations to minimize uncertainty and make better decisions? If yes, how?) is one hundred percent, which is what i'm saying is the ability to act on data. So an insurance company, Let's say, uh, let's say you have a property, And you know that your property is in the in an earthquake zone and earthquake happens every year. Insurance company. What would they do? They would charge more premium. Right? So that's the insurance company's ability to minimize uncertainty, right? To charge you more. So now with available data and technology, they're getting better and better. So let's say that's why they have sensors in cars now. Right? So if they know that, let's say, um, you are a driver of, let's say, twenty one years old and you drive very fast. They know they have to put twenty five percent more on premium. So that's an example of them.
80.	RM	What skills are required for analysts in an organization? For example, a strong skill set that combines technical and business acumen.
81.	JP	So I there is something in my book I call Datapreneurship. So Datapreneurship like entrepreneurship is more of a personal accountability. So if Rob is an engineer and he knows something is wrong, he's not going to keep quiet. He has to communicate, he has to influence, he has to follow the process to make sure that the outcomes happen. But Rob didn't stop those things because Rob did not have the competency of communication and influence. He did not have the competency of process, even though he's in America.
82.	RM	So Datapreneurship is more about ownership, taking ownership?
83.	JP	Datapreneurship is a competency. You know what a competency. Right? So a competency of managing machines, for example. Right, let's say I'm working in a factory, I know how to switch on the machines, I know how to maintain the mission. So that's my competency. That's Industrial age competency, the digital age where we are living today, there is so much of data available, we need to know what to do with the data, right? So Rob needs to know what to do with the data. He knows he has data, but he doesn't know what to do with it. So I'm saying that Datapreneurship, that one decision that Rob had made that day would have prevented billions of dollars of lost to the federal government. Ok. So that's what I'm saying is the key people skill that's datapreneurship as a competency, and if people

		are not having the datapreneurship competency today, like the four hundred companies that have disappeared, more will be disappearing. So right, just because I don't know to say what to do next with the data that I'm seeing. And every company is in danger of that, which is why banks are losing value today. You check the value of market capitalization. You know what's market capitalization? Stock value, for example, the financial value of the company, uh, its getting smaller and smaller and smaller because they're not making good decisions.
84.	RM	And I was going to ask you, so what if Rob is not a decision maker?
85.	JP	Rob has to be a decision maker. Everybody has to be a decision maker.
86.	RM	But you can't make everyone in decision making.
87.	JP	Are you going to believe me or not. Thirty five thousand decisions per day is what a human being makes. A child makes four thousand decisions a day. Yeah. So what makes you say that Rob is not a decision maker?
88.	RM	Maybe whatever that needs to be done, it needs to be approved by management.
89.	JP	That's what your industrial age mindset has decided. But that won't work in this digital age.
90.	RM	So also you're saying that also this decision making processes needs to change?
91.	JP	Uh, yes. Do you want to sink more companies like the fortune 500 companies? Do you want more companies to just disappear? You want every company to be like, Nokia. So you need to better start making decisions every level.
92.	RM	So you you're saying that decision should be decentralized
93.	JP	Decision should be relevant, right? So that means you say rob should have had the decision to fix the dam. Rob has left it to the governor of San fransisco who didn't know what the f*** was happening with them. Excuse my french. Right? So that's what I mean to say, if you let's say you're running a business of hotel and your hotel is not doing well. Right? Are you going to tell your commerce minister my hotel is not working? Well, now what are you going to do? Make sure it works, right? You're losing money, so if you take ownership the world is yours. Planet earth is yours. You don't act, things are going to go really, really bad. Have you seen this movie Happy feet? You see what the penguin does, that’s exactly what everybody should do. Otherwise the glacier will melt, right? So you won't have anything to stand on. So that's what I’m saying is the competency of the digital age, that you can't leave things to others. You need to take ownership and you need to act on it, right? Because data is yours.
94.	RM	Maybe do you think need more skills are needed apart from them.

95.	JP	So that what I said, it's a competency. The competency is made up of skills: communication and influence. Second one, is process discipline and third is datanomics. Ok, so what I teach and what I tell is that, ok, these are the fundamentals that you need as a basic to survival, the digital age for any company to survive. Beyond this, if you want anything else? Right? Let's say this is a furniture company, right? Competency of managing furniture, that's part of it. Anyway. Yeah, let's say you're running a hotel running over the part of it anyway. So above and beyond this, these are the three things you need to start learning fast to succeed in the digital age.
96.	RM	Could you expound more on datanomics?
97.	JM	Datanomics is managing and understanding the value of data. like we spoke about the equipment company that brings the TV, home alarm yes, and all the data coming in, that's not very valuable, right? Maybe zero value, you don't care about it. And you don't care about it. Now, suddenly you add Robi Morro as a data, this data now is valuable or not? It is very valuable, right? So that's datanomics.
98.	RM	um, I am think the skills of analysts in organizations. What's your view on that? Are they the same…
99.	JP	Um, something closer. Yeah, what i'm saying is they are not a differenciator, what's important is what you do with this competency. Because if you don't do this, we are always useless.
100.	RM	And what about um, centralized and decentralized should um, analyst in an organization with centralized or decentralized
101.	JP	So there is pros and cons. So what's starting to happen in many businesses today is, in the digital age, a new dimension has come where, you know, literally almost everything is globalized today. Right? So geography happens to be an important dimemension in every organization. So which is why most organizations have something like a group Versus regions, regions or business units that. right? So what happens is like, let's say this will be a core group of competency. And they will be like the reflection of that. So the core will be here, they will give you the standard guidelines. They will give you the governance, frameworks with executions happening at the local level. So what I am saying is BI is a very small part of a much bigger topic called data. Like for example, if you take a BI view, you won't be covering GDPR which is very important today. Right? You don't care you're just focused on I want intelligence. Okay, I want intelligence, I want to diligence. You're not worried about other things which are as important. Yeah, somethings you need to balance. Um, so in many places, there will be a hybrid of uh, central vs decentralised.
102.	RM	So that's the best model?

103.	JP	Always, hybrid, hybrid always works best.
104.	RM	In case of business users should they have a knowledge and um, and how to work with data
105.	JP	Today, even if you're running a tailor shop, you need to know about digital data, otherwise you will pay a price in fines.
106.	RM	So everybody needs to learn.
107.	JP	Even a fireman needs to learn data. I think if you just search that, I wrote a lot of articles on this specific topic, like fireman needs it. Uh, everybody a doctor, a painter, if you don't do it now you'll be paying a fine for sure. So in fact, I'm even teaching doctors how to use data. So there are no exceptions.
108.	RM	And I think you would agree with, um, question number sixteen, that um, the level of knowledge of business users, it would directly affect the data driven organization.
109.	JP	So I think coming from a mindset of old data analytical engineers. That's old school. As far as I'm concerned. I'm saying if you don't understand what is the use of data in your life, you are in deep trouble with your life. You pay for it somewhere, right? Your data will get stolen, your card will disappear from somewhere. Something's gonna happen for sure if you don't know what to do. So which is why I started to write my book to begin with, many years ago. When I said, okay, people are not understanding the importance of this. I need to do something about it, which is why I started to write it, is to educate people that, it is important to take care of data. So next time we'll be telling the government you need to be very, very careful about these people. We need to protect it like it's trillions of dollars. So what I would say is everybody needs to have a base level of knowledge of data as to what it is, what role it plays in their life. That's what I wanted to do in my book, to give everybody a knowledge about data. Even if you're seventy year old grandfather, you at least need to know if you want to have a bank account, then you want to make an online payment. You at least need to know this.
110.	RM	I agree. Yeah. In terms of implementation of business analytics, how should users be involved in the implementation of business analytics new technologies and systems?
111.	JP	Of course. like I said, the BI system needs to be person centric. So that means whoever is in the processes, in the involved process needs to contribute to the requirements. So Rob here needs to contribute, governor of the state needs to contribute so if any of them are not there, then something is not right.
112.	RM	So what else do you think is essential apart from BI capabilities?
113.	JP	Check dama framework, you will get the holistic picture of data.
114.	RM	Who came up with Dama framework?

115.	JP	UK, just like you have TDWI, it's data management association. It's quite good, I use it a lot.
116.	JP	Another important thing is to mention that data connects the dots between people, processes and technologies. So that's what I call as the data strategy blueprint . There is something called data strategy blueprint, which you will find in the book which gives you like the maturity model of data. So let's say you go into a company, and you're going to be telling how mature is the company in managing the data. So you come up and say, Are they ABC. So let's say they're at a or b you'll be saying, okay, you need to do a b c x y z is, ten things to become like Amazon. Then you become like an amazon. Yeah, most valuable company. Oh, you become like an apple for you become like the google, you benchmark outputs.
117.	RM	I think number 19 we sort of answered it previously. And in organizations currently employing the BI system, is it popular that one can always ask for additional information or to challenge assumptions, is it a requirement, an open culture like that?
118.	JP	Of course, what I practice now I think for the past maybe five years, I've been practicing something called lead management. Lead or agile. Agile management, there is a guy I know. He's written a book called, I think, Agile BI. I wrote to him last week, you can find it on kindle. Okay. Uh, It's called Agile BI. So, ok, the principle is, you know Alps rights Swiss Alps? So the principle is that it's called 'The alpine hill climbing approach.' That means to say, when you're climbing up, you go one step, you wait there, you go next step you wait there. So you're minimizing uncertain, you're eliminating the risk every step of the way, because you don't know what will come ahead of time. So to be successful in these things, you always learn more as you go. So here what I'm doing with IKEA is I make one week at a time. I'm not seeing more than a week. So okay, yes, I do have a big long-term plan, which I'm going to be doing after six months or one year, twenty-four months. Again you will find a very good article on my blog it's called the definition of done. So it'll be something like this. What you know today, what you know next week, what you know you know, had a little time. Yeah, so you won't know everything here. And previously, a lot of projects used to fail like multi millions, billion billions because of this approach to just finish the whole product. And then you find that you don't need it or it doesn't work. So you if you want, you can check the amount of projects that are failing you. So now companies can't do that, So you have to find a better way to find out what is working. Well. Okay, so yes, you need to challenge assumptions every day, every minute, till you get better and better and better and better.
119.	RM	Okay, what would you describe this in a data driven culture?
120.	JP	A company that is making their decisions every minute, relevant decisions, every minute. Faster decisions, good decisions, the right decisions.
121.	RM	Is that possible?
122.	JP	It is possible, you make thirty-five thousand decisions a day. Why don't we make decisions that matter?

123.	RM	So it's a decision that matter, and they should be based on data.
124.	JP	Yes. So my point is that when we are capable of making thirty five dollar decisions, that's about seventeen million decisions a year. Why should we not be making one or two good decisions a year, which will make sure companies don't disappear? Right? So that's the difference. And data helps, So, uh, data driven culture is choosing what decision to make and choosing what decisions not to make, choosing how many meetings I need in a year is a waste of time for example, when you're just trying to make yourself busy. Choosing how many customers to serve and make sure you are serving them accurately is an important decision. So that's what it means to a data driven culture. That means your morning starts with data, your evening ends with data, right? That we did exactly what data said what to do or what not to do. Today we are talking about robotics and artificial intelligence. Everything runs of data now, if you are not data driven, your machine is going to be better than you. You don't want your manager to be a machine.
125.	JP	Are you aware of Fact based culture? What does it mean to you in your experience? In your opinion are most organisations that are considered data-driven practicing it? No, they are not practicing it. Which is why the ability to act on data is low. So you my evidence is companies disappearing, financial value eroding. We are unable to respond to natural disasters. We wouldn't be having these problems today with available technology if we knew what to do with it. So that's evidence that we have a long way to go. We are not leveraging our capabilities well enough to make our lives comfortable or easier.
126.	RM	What kind of support is required for management for the success of a data driven organization?
127.	JP	So here invest in people and datapreneurship as a competence, because you have thousands of tools and technologies, but if you don't have people to make the decisions like rob, your dam will fail you. I think fundamentally we have to recognize it's all about the people. Yes, if your company is not helping your community, if your company is not reaching, if it's not eliminating poverty, for example, you're not giving water to people, if it is not giving energy to people, what good is it? Even if it's a hundreds of trillions of what good is it? That's the point.
128.	JP	How can organizations ensure that their employees are data driven? Training and development.
129.	JP	Which strategies have proved successful in promoting a data-driven culture in organisations? Again, training and development.
130.	RM	Yeah ?still?

131.	JP	Yeah, yeah, you need to train continuously. Continuosly, training and development. Learning is a continuous process. If an organization is not learning, Nokia.
132.	JP	Is it necessary to have leadership from top application? Otherwise kiss your company goodbye. It is one hundred present. You check the fortune 100 list, every company that is valuable today, the top ten , all data driven companies. And that's your evidence. If not, Nokia.
133.	RM	Do you think Nokia didn't act on data or were they too slow to act? I once watched a TED talk, um, this consultant was sent to China to see what people prefer in terms of phones. And people preferred touch screen. And then she went back to Nokia and said this is what I've seen by just being with people. But Nokia said that not what our data tell us, out data show that customer still want to use normal phones. So they relied on their data from the system that is generated by the existing customer. So that it is interesting that sometimes you can have your data, you think you have right data.
134.	JP	So that data is coming from which processes is the question. That data is a reflection of which business process, is a reflection of which business model, is a reflection of which business strategies. So they're obviously relying on data from a strategy which was giving them a bias. But if they were the independent of a bias and they worked backwards in the share holders interest, then their question would have been different. So the person would be, ok how do you want to add more value to your shareholders? How do you add more value to your customer? How do you add more value to your employees? Then their questions would have been different. Their data capture would have been different. Answers would've been different. If I create my own data. Okay, this is what i'm gonna say and it's going to say what I'm going to get there .So it's connecting the dots.
135.	RM	Is it necessary to have a business analytics champion in every department? Why?
136.	JP	I would say datapreneur is key for success of every organization today. Because if Rob is not a datapreneur, the dam fails, right? And Rob has to be a datapreneur, there's no choice. Even if it's a fireman, if he is an engineer, anybody needs to be a datapreneur, otherwise they'll pay a fine.
137.	JP	Uh, that's twenty-seven. Okay, what units should initiate and drive business analytics projects for the project be initiated and driven by business partners. I am very clear about this that it is the economic value. That means, what I mean to say is, let's say you're running a hotel business. What's important to you? What's the most important thing for you as a business owner? Its value, economic value. If there's no economic value, would you do anything for charity? So I am saying the most important thing is economic value. It's called EV. Even if you go to yahoo finance, for example, and you check EV, you will find which is different from uh, other values. It is the same as market capitalization. It's something similar to that. Okay, so, what unit should initiate. So my viewpoint is, my argument is what values is it giving? So when somebody new engagement, new project comes my way, I say, what's the value? Is it to give better value to the customer? or to give better value to the employee? Does it give you a better value to the partner? who's going to benefit from it? Is the question. Any of these benefit are all the shareholders

		benefits. Right? The question is who benefits first? What's the priority? That's what you need to work with.
138.	RM	And so it doesn't matter when you say the value then it can come from even IT.
139.	JP	It can come from anywhere. It doesn't matter as long as a liberty of giving a dollar value to your share price, your economic value. If It's a profit organization, if it's a charity, the value is more efficiencies. It's not profit, but efficiency is how better are you doing it. So that's better, faster, cheaper.
140.	JP	How can organizations ensure that analytics strategy aligned with the business strategy? So I think the book will clarify a lot of that in a lot more detail based on this concept. You even have a graphic which clarifies that for you very, very clearly. And in fact, there's also an info graphic you can access on my web page. When you register, you'll get an info graphic, which will give you all this series of graphics, which you can use ready-made very high quality graphics.
141.	JP	What kind of analytics do most organisations utilise when using BI? Is it descriptive, diagnostic, predictive, or prescriptive? Why is that so? All! You need all. But most are not doing it, including IKEA.
142.	RM	So they're still here. Would you say?
143.	JP	I don't want to say that, but when you see the data strategy blueprint, you will have your answers. But so when you walk into a company, when you use the data strategy blueprint, you know exactly where you stand. So let's say you're running a hotel, or let's say you're running a fashion boutique. Let's say, right? And you have the data strategy blueprint. And you ask this question, you'll know exactly where you are. You see that blueprint, and you go into any office and you ask them, ok, where do you think you stand, you will know.
144.	JP	So in fact, I can tell you what every person, not everybody is using this (predictive). Uh, that's why they're preparing to use big data and analytics. And you know I have an example of seventy twenty two terabytes of data in a bank, for example. And they're not even using a percentage of that data for decision making. So that's how bad it is.
145.	JP	In your opinion, which process(es) of current BI systems is/are the most challenging? Why? I think if I say data acquisition, transformation, distribution, and consumption, or let's say the demand side of the software side, supplies side is a problem. That means your ability to act on data is a problem. So you have data, lots of data. But what do you do with that is the problem. So what processes? The process of accessing the data to make the decision is the challenge to fix.
146.	RM	How?

147.	JP	First thing is training and Rob needs to be trained. So if Rob is trained, Rob know which day to pull to give an answer to the governor of the state. Same problem everywhere.
148.	RM	So the lack of datapreneurship one can say also?
149.	JP	Yes. As far as I'm concerned, we are paying a big, big, big price. It's very expensive, of not acting on data. And you know, companies are disappearing. That's a fact. If you don't, your sales are dropping, your efficiency is decreasing. You're getting fights before you know you obsolete.
150.		What are the obstacles if any preventing most companies to transform being data-driven?
151.	JP	I think the obstacles is called Legacy culture
152.	RM	That's a good one.
153.	JP	So in a traditional bank now or in a traditional company, you have a lot of legacy issues because you have been doing this all the time.
154.	RM	I think it's also in the people's mindset is not just, um, the organization. You're used to excel and you just wanna work with excel.
155.	JP	Yeah, yeah, absolutely. So what these big companies do typically is get a chief digital officer or a chief data officer from somewhere. And they expect them to fix everything, which is not going to happen, because first thing they need to fix their own people.
156.	JP	And you check many reports, you will find that uh, It's called legacy culture. So in every company, there are a lot of legacy systems. Its legacy debt, its architectural debt that you have created, these big systems, huge systems, legacy systems for tens years, tens of years, even hundreds of years. And suddenly you're stuck with them. You don't know what to do. And a new company comes in year 2000 and suddenly they are ten times more valuable than you and they're taking away your market share. They take your customers off, your suppliers and nobody wants to work with you before you know you're a Nokia.
157.	JP	What are the obstacles if any preventing most companies to transform being data-driven? If you ask me that, it's people again. Um, It's not a technology problem, nothing else. Not a finance. Not that you don't have money, you have money, but you don't know what to do with your money. Um, before you know, your money disappears.
158.	RM	Ok. And just the last one. Is there anything? IT's just in terms of what other factors you see that are important to basically last week, we haven't covered yet.
159.	JP	So people are the most important cog in the wheel in in digital age. Everything else is secondary. We need to fix this fast and first in every organization. And if you get that right everything else comes right.
160.	RM	And how do you do that?

161.	JP	Training and development. So investing in competence is, investing in datapre-neurship competence is key for survival. So, I think that's my input for your questions.
162.	QY & RM	Thank you very much.

Appendix 6: Interview Transcript [Rsp5]

Date: 11:00, 25th of May, 2018

Duration: 60 minutes , 21 seconds

Interview format: Phone call

Transcribed by: Robi Morro

Transcription checked by: Qinyan Ye

Transcription date: 26th of May 2018

Researcher 1: Robi Morro: RM

Researcher 2: Qinyan Ye: QY

Interviewee: Johnny Nilsson

Company: CGI

Row	Speaker	Text
1.	RM	Okay, so can you please tell us a bit about yourself, your organization and your responsibilities?
2.	JN	What I do actually in CGI, CGI is a big company, we do a lot of things. I am in a part of CGI that was bought from a data driven small company in the Nordic called xx just before this year started. So, we have developed a branch called xx, and in xx, we are doing emerging technologies. So, what we actually do is we are working with data or in data, we work with digitalization, we work with questions like sensors, data, warehouse, data quality, all the things that you think about when it comes to digitalisation. So that's what we do within CGI and that's what we do with our big clients as well.
3.	RM	Ok, I'm not sure if I got you correctly. You said um, it was brought with a data driven company, the part that you are working in?
4.	JN	Yeah, actually in Sweden, they didn't have that much, they had some but not much in the BI sector. So, what they did, they bought a company of thousand employees in Finland, Sweden, Norway, Denmark and the Baltics and so they're acquired a thousand employees and from that they also acquired the BI knowledge.
5.	RM	Aha, ok, I understand. And what about you? Your current responsibilities and your experience?
6.	JN	I'm sales director in the south meaning Malmö up to Jonkoping in the South area of Sweden. So I work in this area called BI and analytics.
7.	RM	Okay, how many years have you worked in that position?

8.	JN	A little more than three years.
9.	RM	Okay, that's great. So how do you understand the terms Business intelligence and data driven organization.
10.	JN	Uh, well, in our terms, thinking from our point of view, that will be the way of helping our customers to take better decisions in their daily business. That's what we do know. Uh, business intelligence for us then and to be data driven is to help them to take better decisions in their daily life. Um, and also, giving them an understanding of what they can do with the help of the data. That's what we usually do.
11.	RM	Okay, so, what do you do? Do you recommend technologies; do you recommend the processes or what is it exactly that you do?
12.	JN	No, usually I don't recommend technologies even if it's a part of it, but I work with the solutions based on what the customer needs or lack of or have pain of. So usually we have a discussion with the customers they tell us of how the situation is in a certain area. And based on that I try to see what we can do to help them with help of their data. If they don't have their data, then we help them with collecting their data like sensors or something else, or integrated or buying data like big data. So that's what we do, we help them enabling in their quest for faster and most cost efficient or whatever will be. It's a long answer but that's the core of the business. To help our customers help they to understand what they can do with data.
13.	RM	In your experience, what are the motives behind for organisations to become data-driven?
14.	JN	Um, probably standard answers: cost efficiency, helping them find new business models, but also in a way, letting them focus on the business with the help of data instead of IT, so we try to give help with data so that they could focus more time in their business than data. So, Yeah, it quite impressive, actually. So today we see a lot of disruptions companies that are data driven like, you know, UBER, Airbnb and they don't have the legacy systems. So, they come in and they change their business model quite quickly.
15.	RM	Okay, so would you say that there's data-driven business model?
16.	JN	Yeah, absolutely, that's what we aim for.
17.	RM	And how does that look like?
18.	JN	Like I said, you talked about the motives, right? So back to my answer, it needs to be cost efficient, focus on the business and also develop a new business model. That's what you can do with the data, to find new possibilities. So that's what you should try to find. If it's more cost efficient, it can be trusted.
19.	RM	And what is the role of BI in enabling a data driven organization?
20.	JN	It's about collecting data, it's about securing the quality of data, it's about helping organizations to get bigger perspective of their business. Usually they have silos and they know details. By help of merging different silos together we find different discoveries.

21.	RM	And um, question number five. According to research, the technical BI the capabilities can be such as data quality, integration of BI with other systems and user access. What is your view on these capabilities in enabling data-driven organisations? How important are they?
22.	JN	Oh, the it's like I already said actually, today with all the data that we actually tried to align, data quality is key. If you don't have data quality, it's very difficult to talk about analytics, machine learning and artificial intelligence, you can forget it. So, we have to talk about data quality. So that is very important. So I would like to say that one of the most important thing is data quality. Without that your every decision will be wrong.
23.	RM	So, you would say data quality is like the primary thing?
24.	JN	Yeah, even if they don't have all the data, they can do something. But if their data is not good enough then how can they trust it.
25.	RM	So, does it have to be perfect?
26.	JN	No, doesn't have to be perfect, but in a perfect world, yeah, I mean, that's a tough question. I'm not the perfect guy myself, but yeah, it has to be very close to perfect, I think, because if the volumes get very big then the errors will be too, so yeah, it has to be very good at least.
27.	RM	Okay. And what about integration of BI with other systems?
28.	JN	Yes, that's also important, the integration makes the bigger picture of it.
29.	RM	Okay, and user access? how it should it be distributed? should users have access to all the data in the system sort of in terms of data should be decentralized or,
30.	JN	Yeah, I think with data access, all the data is supposed to be centralized. Yeah, somehow centralized. So, it's not for everyone, no, that's the simple answer. You have to have some kind of guidance around it.
31.	RM	I think we will discuss further on user access later on. How does data affect an organization to be data driven or the lack of it? And maybe if we can hear your view about data management for organizations.
32.	JN	Yeah. And what I face usually is let's say utility company to give you a concrete example, they are very good in collecting data. They're not always that digital or so, but they are very good in collecting data. So, from that perspective it is always easier for us to ramp it up because they have data. In other cases when you come up to a company that don't have data, we can do the same. But we don't have the history. Based on machine learning and data analytics, you can't help them that fast to get the knowledge they might need because it takes some time. So you will have the bad data. So, yeah, if they possess data, they have a better start. That's the short answer.
33.	RM	Okay. I think if I understood, you mean that the lack of data could slow down the organization to enable data driven?
34.	JN	It could slow down, yes, uh, because they don't see the potentials and with more data and to collect more data it takes some time to learn from it, because its only

		from today they don't have like five or ten years back. So, for the company that have data a long time ago, in the past, they have much more to gain.
35.	RM	Yes, okay. And what are the challenges organizations face when it comes to data, if there are any?
36.	JN	Should be sometimes to understand the possibilities with data. I think that usually the challenge, they know what they need, but they are so into the daily work and when they find the work is going well, they are not eager to invest. Because its new technologies and you know, changing things that they worked before, it's a little bit about what's on top of your mind. Sometimes they're not that data driven. They think they have done it for twenty years and it will be the same next twenty years as well.
37.	QY	What about how should data be managed? For example, who should manage the data?
38.	JN	Yeah, I don't have a good answer to that. We usually work with data warehouses and so on. It's not a single solution, of course. In bigger companies, we think that securing data quality in a big data warehouse or something like that, enables them to be free in their tools and on their front end. So they don't have to be, sometimes they take data directly from the source, and that makes them more vulnerable if they have to change something in the future, because they have to do everything from scratch. So that's a little bit of different approaches to try to do some middle layer or something, also from integrating different sources. So that is quite a normal day for us to talk about to integrate different systems in the kind of data warehouse.
39.	RM	With regards to user access, we talked about it briefly before. When it comes to BI systems, how should access be distributed? Should access to data be limited to subject experts or distributed to the whole organization?
40.	JN	No, I think the truth about this should be a subject matter expert or somebody to guide it. Yeah, that's what I think.
41.	RM	So, are you saying that if there's a junior analyst in the marketing team, they should request access still for what they need from say, the BI department in the organization
42.	JN	No, that is someone working in the marketing department , somebody who knows about the data. So it doesn't have to be IT. I don't think that's ideal to have everything in the IT. I think you can have a BI expert in the marketing side as well, but for a junior or somebody else working with marketing data, maybe not knowing the consequences and so on that's very dangerous. It's important to have somebody to guide.
43.	RM	Should BI systems and tools be integrated with other existing systems in an organization? And why is it important?
44.	JN	It depends on what kind of the system. Integrated in my term when hadhoop is integrated for example it means it gets access from other systems. That they can do for example in the data warehouse. So yes! My answer is yes, it is important, I think I already said that. I mean, you have multiple sources, you have Microsoft, you have the excel, and you might have some of your own systems and collecting

		all that data in some data warehouse, it's important because then you can get the whole truth and not a single truth.
45.	RM	Okay, so, let's talk about the flexibility of BI. This is if I can clarify it when the BI is able to provide decision support when variations exist in a business process or technology or the business environment in general. So, basically, it means, for example, if business processes need to change, how should business intelligence be? Should the process follow the business intelligence, or the business intelligence should be flexible enough to be able to fit in?
46.	JN	BI should be flexible enough to handle the business process, yes, that's my short answer.
47.	RM	And why is it important?
48.	JN	So difficult, Uh, why, uh, I mean, if we are reversing, you have a business that have to be limited the system. The business should never be limited by a system. So that's my main point.
49.	RM	Yeah, that's a good point. People process technology and external events can present risks to an organization. In your opinion. You think BI can assist organizations to minimize uncertainty and make better decisions?
50.	JN	Yeah, that's my daily work. So yes, it must be a big yes. Oh, yeah, I mean for instance, take a manufacturing company. They have a machine that's not working properly. And the quality is not really good. Some managers, they know about the functions. But if you can collect data three years ago, back before, and you do it with five hundred other machines as well similar to this one, you can get a picture of what to expect. If you're looking at a longer time, you really see that there are variations. So that's one way of looking at it, uh, with the help of a lot of data. I think this is a good way to actually predict the future. It's not a short answer, but yeah, this is usually how I have the discussions in these kind of sessions.
51.	RM	When it comes to people skills in organizations, it's regarded as a key capability that contribute to enable data-driven organization. What do you think the kind of skills that are essential for to enable a data-driven organization, because not the normal skills that are required for your job, but the extra ones?
52.	JN	I think you have to be, today you need to have some kind of innovative thinking and curiosity, very important. you have to be willing to adapt to changes.
53.	RM	Okay, in terms of analysts any extra skills for them, or in general, those can also apply for analysts, apart from the technical skills.
54.	JN	For the analyst? That might be understanding of the business, again, because technical skills are very good. But if they have also an understanding of the business, then they can use it. That's not one plus one, it one times one is three. A little bit like that. Then it adds more value.
55.	RM	And should analysts be centralized or distributed to different units? And what do you think are the pros and cons for both in your view?

56.	JN	I think, to have good analytics it should be centralised, and I think they can use the knowledge in different areas in the company. Yeah, centralised.
57.	RM	Oh, so you think centralized is better?
58.	JN	Yeah, Because I don't think it's realistic to think that you have a good analyst in every unit. So sometimes it's better to have one good centralized who are have developed the skills for the companies needs and capabilities rather than small units and less skilled. Ok, maybe it's the equal skill in every unit is very good, but I don't think it's realistic to think that way.
59.	RM	Ok, so maybe it could be that you have for example, the analytic organization, they call it like a data department in organization. And then you have this analyst in every unit that maybe they have marketing knowledge, but they also doing analysis though they get training from the BI team.
60.	JN	Yeah, that's right.
61.	RM	In case of business users, what is your opinion on whether they should have knowledge on how to work with data and BI applications, or should they rely on IT and data analysts?
62.	JN	I think the business users should have some kind of sense of what they could do with BI or data. That's important. They should not only rely on the data, not only.
63.	RM	Do you think that would affect the data-drivenness of an organization if that knowledge is distributed?
64.	JN	Yes, you have multiple sources to influence.
65.	RM	How should users be involved in the implementation of business analytics, new technologies and systems. Uh, for example, there is a project in the organization, should they be asked to?
66.	JN	It's always good to have some persons from different units who speak their mind or engage in these things and let them. It's good because if you only take it from the top, you intend to have problems. Maybe people in the units will be saying they don't understand it in the top of the management. They don't know the business, or they don't understand how we are doing things. So yes, I think it's good to have some kind of alignment in this.
67.	RM	I think then that it helps in terms of buy in for the future. So, they can actually use the system because they participated. Right?
68.	JN	Yeah.
69.	RM	What else do you think is essential for the success of a data driven organization? Maybe we can add on to number nineteen, which says is it the right technology, the right skill set and processes or the organization culture that supports the data-drivenness.
70.	JN	I would say first organizational culture, because it doesn't help with the system if they are not having the right culture. So first have the right culture. And then of course you have the technology and tools. A lot companies have the technology

		and tools but they don't have the culture, they don't have the innovative mind. So, it doesn't help for success anyway. Okay, uh, how do they influence each other? If you have both the technology and you have the right mindset and the organization that you should make it flies, or you have some kind of engaged person within units usually flies from there.
71.	RM	So, the Engaged person is like a champion in every unit?
72.	JN	Yes, I think that's important to have a champion in every unit. You want some success. Yeah. If you don't have a champion in any unit, it usually takes longer. I think it's important with a champion in every unit. If you only have the boss from the top saying it, it won't fly, Yeah, but yeah, engaged champion in every unit. That's a good way.
73.	RM	What would you describe as a driven culture?
74.	JN	Yeah, a data driven culture is actually where you build your business based on data. I mean you don't do it from what you think and what you think and what you believe. You actually take decisions based on the data that you have. So that's describing the data-driven culture for me.
75.	RM	Ok, so is it like in the data driven culture, is it popular that one can ask for additional information or challenge assumptions?
76.	JN	Yes, I think you should be able to do that. Adding additional information could actually help you to revive the decisions as well. So Yeah. Challenge assumptions, I don't know how to answer it, but asking for additional information is both important and key. But if you have an assumption, we want to challenge it. Yeah, I mean, in what way could you challenge if the data you have is probably right. Yeah, of course, you know, you might have the assumptions that the data has changed. It's a little bit difficult.
77.	RM	Ok, I think probably, well, maybe we can use an example of Nokia. Maybe they assumed that everybody wanted the normal phone...
78.	JN	Yeah, sure the market and yeah, Steve jobs said something different with iPhone.
79.	RM	Yeah, and then everybody moved. So, I think that's more of challenging assumptions.
80.	JN	Yeah. And that's a good way of thinking. Because of course, if you have data from Nokia that said something and the market or the future or the trend said something different. But of course, if you also would be able to collect data from big data you might be able to predict it as well. I mean you have there are a lot of forums and so on where we can collect data, so I still think it's all about which data you take the decisions from as well. So again, you can challenge the assumptions as well. Of course, you can do that by saying that we might not have all data we need. Now that I have to rethink it, it's a good way that you said Nokia. So it's easier for me to get a picture of what you want.
81.	RM	And, are you aware of the term fact-based culture?

82.	JN	Uh, yeah, yeah, not very, but I understand what it means.
83.	RM	Ok. What does it mean to you in your view?
84.	JN	It means that you don't take it on the emotions. You have to have the facts, you have to have the figures. So, if your emotions said something else, you take it based on the facts.
85.	RM	Is it that organizations that are considered data driven, are they practicing it?
86.	JN	No, of course not, not every organisation. You said most. Yeah, most of them might actually practice. In Sweden we might be quite ahead I think.
87.	RM	What kind of support is required for management for the success of a data-driven organization?
88.	JN	I think the support should be that they have some kind of engagement in the capabilities. So, I mean the management, has to be the sponsor. You have to have management as a sponsor.
89.	RM	How can organizations ensure that their employees are data driven?
90.	JN	I shouldn't say training, because it's not about training, but it's about showing good examples again. Showing good examples is the point of the success factors in the company to get people engaged.
91.	RM	So, it's a good example from leadership maybe?
92.	JN	Exactly, leadership is important because if these leaders don't understand it's much harder. It shouldn't be impossible, but it's harder. Then you have to find some champion somewhere. If you don't find a champion then it will never fly. But if management, if they understand it, it goes much quicker.
93.	RM	Which strategies have proved to be successful in promoting a data driven culture in organizations?
94.	JN	Well, I don't know, I don't know what strategies. Usually it's about helping them with a pain somewhere, or an urge of a desire of doing something in a special area. But if it's about the strategies, I don't know I don't have a good example on that.
95.	RM	What units should initiate, and drive business analytics projects? Should the project be initiated and driven by business departments or IT departments?
96.	JN	I think today, it's usually driven by the business departments and not IT department. And I think the most successful factors come from the business department. Because systems of IT are driven by business.
97.	RM	Okay. What is the role of each department? Why do you think it's more successful when it comes from the business, maybe if I may ask?
98.	JN	They know the pain, they know the needs. The IT does not always do that. So that's why.

99.	RM	Ok. And do you know the roles they play?
100.	JN	I think that success factor is when the business is engaged, they have some kind of champion or something like that. Again, if they are in it and they are working with the project, it's a success factor.
101.	RM	Okay, how can organizations ensure that the analytic strategies are aligning with a business strategy?
102.	JN	When we do a business strategy, it's always aligned with the business, and that means also analytics. That's how we do like this way to business strategies, and we have to listen on to how business strategy is and we are aligned.
103.	RM	So, you're saying that all these strategies must align to the business strategy. That's what you're saying. Right?
104.	JN	Well, I should, but it might not be black and white, because of course, if it means that you believe it will be negative for the business with only aligning analytics strategy. Then something that might have to change in the business strategy. So, well, it's not black and white.
105.	RM	What kind of analytics do most organizations utilize when using business intelligence? Here we just want to understand what is the state at the moment? Is it that most organizations are at the descriptive or diagnostic stage, predictive or prescriptive?
106.	JN	I like the question because I have a power point that, just about being proactive and prescriptive and then only working with the decisions based on reports. But I think that most organization have to understand the distinction between both diagnostics and descriptive. I think I'd say diagnostic, most of them are between that in diagnostic. Everything is slow and you have a lot of organizations that are predictive today but we still have a long way to go. So, it goes slow. And one thing that actually is a problem in Sweden is the lack of skilled educated people. That's actually a risk factor in Sweden that we don't have enough people to do it. I mean everybody's talking about our data and artificial intelligence that would take their jobs. But I mean today in Sweden we don't have enough consultants and twenty years ago they said that computers would take the work away. I haven't seen that yet.
107.	RM	No. I actually don't believe in that. I believe it actually creates jobs.
108.	JN	Yes, it creates job. I mean I have good examples from seminars in Sweden where one guy talked about the monks like thousand years ago in the monk they write a book. It took months years to write a book and if you could if translate the cost for today, that would be enormously costly to do a small book. But going back today, we print books and there was a notion that all these guys would be unemployed now, when the machine comes, that didn't happen. So, it's the same today.
109.	RM	Correct. I think if you're proactive enough and educate yourself in the new skills, then you become more marketable.
110.	JN	Yes, the needs are different.

111.	RM	Do you think that's the only challenge that's facing organizations at the moment, the lack of skills?
112.	JN	I think still knowledge, knowledge about the possibilities. People don't understand the opportunities ahead of them and they're afraid, and there a lot of issues on deciding what to do with the data. It's like that nobody wants to be the first. Everybody wants to see what the rest have done.
113.	RM	In your opinion, which processes of current BI systems are the most challenging and why?
114.	JN	Now you are back to BI systems again. I don't know what to answer but I'm thinking, the challenging part now is when it comes to machine learning, or when you talk about artificial intelligence, to get these kinds of systems flying is kind of challenging because they are dependent on data quality and how innovative people are. They are quite afraid of the new possibilities and that one challenging side of the BI system and would like to say that the predictive side.
115.	RM	So, it boils down to skills of the people?
116.	JN	Yeah, somehow skills, Yeah.
117.	QY	Can I ask the question about the communication? how should different parts of organization communicate with each other? Um, is it important for data drivenness? And how would BI affect this?
118.	JN	Uh, that's a good question. You can get transparency of course, that are between the different units, the transparency and an awareness that could be very good. So, if you visualize the data to all the parts of the organization, that's one thing of transparency and awareness.
119.	QY	Is it important for data-drivenness?
120.	JN	Yes, I think it's important, because if you are supposed to be data driven, you're supposed to conceive your own data. And that's one way of getting it back to the people working with it. So they can see the result of it, not only to collect the data and create a black hole out of it. I think it's important that they can see the results of their work.
121.	RM	Do you have anything else you would like to add?
122.	JN	No, I think they were good questions. It's not always easy to answer, but a lot of these questions is a part of my daily work. I hope that it works for you and I hope that you have success in the final of your exams.
123.	QY & RM	Yes. Thank you so much.
124.	RM	Okay, so can you please tell us a bit about yourself, your organization and your responsibilities?
125.	JN	What I do actually in CGI, CGI is a big company, we do a lot of things. I am in a part of CGI that was bought from a data driven small company in the Nordic called xx just before this year started. So, we have developed a branch called xx, and in

		xx, we are doing emerging technologies. So, what we actually do is we are working with data or in data, we work with digitalization, we work with questions like sensors, data, warehouse, data quality, all the things that you think about when it comes to digitalisation. So that's what we do within CGI and that's what we do with our big clients as well.
126.	RM	Ok, I'm not sure if I got you correctly. You said um, it was brought with a data driven company, the part that you are working in?
127.	JN	Yeah, actually in Sweden, they didn't have that much, they had some but not much in the BI sector. So, what they did, they bought a company of thousand employees in Finland, Sweden, Norway, Denmark and the Baltics and so they're acquired a thousand employees and from that they also acquired the BI knowledge.
128.	RM	Aha, ok, I understand. And what about you? Your current responsibilities and your experience?
129.	JN	I'm sales director in the south meaning Malmö up to Jonkoping in the South area of Sweden. So I work in this area called BI and analytics.
130.	RM	Okay, how many years have you worked in that position?
131.	JN	A little more than three years.
132.	RM	Okay, that's great. So how do you understand the terms Business intelligence and data driven organization.
133.	JN	Uh, well, in our terms, thinking from our point of view, that will be the way of helping our customers to take better decisions in their daily business. That's what we do know. Uh, business intelligence for us then and to be data driven is to help them to take better decisions in their daily life. Um, and also, giving them an understanding of what they can do with the help of the data. That's what we usually do.
134.	RM	Okay, so, what do you do? Do you recommend technologies; do you recommend the processes or what is it exactly that you do?
135.	JN	No, usually I don't recommend technologies even if it's a part of it, but I work with the solutions based on what the customer needs or lack of or have pain of. So usually we have a discussion with the customers they tell us of how the situation is in a certain area. And based on that I try to see what we can do to help them with help of their data. If they don't have their data, then we help them with collecting their data like sensors or something else, or integrated or buying data like big data. So that's what we do, we help them enabling in their quest for faster and most cost efficient or whatever will be. It's a long answer but that's the core of the business. To help our customers help they to understand what they can do with data.
136.	RM	In your experience, what are the motives behind for organisations to become data-driven?
137.	JN	Um, probably standard answers: cost efficiency, helping them find new business models, but also in a way, letting them focus on the business with the help of data instead of IT, so we try to give help with data so that they could focus more time in their business than data. So, Yeah, it quite impressive, actually. So today we see a

		lot of disruptions companies that are data driven like, you know, UBER, Airbnb and they don't have the legacy systems. So, they come in and they change their business model quite quickly.
138.	RM	Okay, so would you say that there's data-driven business model?
139.	JN	Yeah, absolutely, that's what we aim for.
140.	RM	And how does that look like?
141.	JN	Like I said, you talked about the motives, right? So back to my answer, it needs to be cost efficient, focus on the business and also develop a new business model. That's what you can do with the data, to find new possibilities. So that's what you should try to find. If it's more cost efficient, it can be trusted.
142.	RM	And what is the role of BI in enabling a data driven organization?
143.	JN	It's about collecting data, it's about securing the quality of data, it's about helping organizations to get bigger perspective of their business. Usually they have silos and they know details. By help of merging different silos together we find different discoveries.
144.	RM	And um, question number five. According to research, the technical BI the capabilities can be such as data quality, integration of BI with other systems and user access. What is your view on these capabilities in enabling data-driven organisations? How important are they?
145.	JN	Oh, the it's like I already said actually, today with all the data that we actually tried to align, data quality is key. If you don't have data quality, it's very difficult to talk about analytics, machine learning and artificial intelligence, you can forget it. So, we have to talk about data quality. So that is very important. So I would like to say that one of the most important thing is data quality. Without that your every decision will be wrong.
146.	RM	So, you would say data quality is like the primary thing?
147.	JN	Yeah, even if they don't have all the data, they can do something. But if their data is not good enough then how can they trust it.
148.	RM	So, does it have to be perfect?
149.	JN	No, doesn't have to be perfect, but in a perfect world, yeah, I mean, that's a tough question. I'm not the perfect guy myself, but yeah, it has to be very close to perfect, I think, because if the volumes get very big then the errors will be too, so yeah, it has to be very good at least.
150.	RM	Okay. And what about integration of BI with other systems?
151.	JN	Yes, that's also important, the integration makes the bigger picture of it.
152.	RM	Okay, and user access? how it should it be distributed? should users have access to all the data in the system sort of in terms of data should be decentralized or,

153.	JN	Yeah, I think with data access, all the data is supposed to be centralized. Yeah, somehow centralized. So, it's not for everyone, no, that's the simple answer. You have to have some kind of guidance around it.
154.	RM	I think we will discuss further on user access later on. How does data affect an organization to be data driven or the lack of it? And maybe if we can hear your view about data management for organizations.
155.	JN	Yeah. And what I face usually is let's say utility company to give you a concrete example, they are very good in collecting data. They're not always that digital or so, but they are very good in collecting data. So, from that perspective it is always easier for us to ramp it up because they have data. In other cases when you come up to a company that don't have data, we can do the same. But we don't have the history. Based on machine learning and data analytics, you can't help them that fast to get the knowledge they might need because it takes some time. So you will have the bad data. So, yeah, if they possess data, they have a better start. That's the short answer.
156.	RM	Okay. I think if I understood, you mean that the lack of data could slow down the organization to enable data driven?
157.	JN	It could slow down, yes, uh, because they don't see the potentials and with more data and to collect more data it takes some time to learn from it, because its only from today they don't have like five or ten years back. So, for the company that have data a long time ago, in the past, they have much more to gain.
158.	RM	Yes, okay. And what are the challenges organizations face when it comes to data, if there are any?
159.	JN	Should be sometimes to understand the possibilities with data. I think that usually the challenge, they know what they need, but they are so into the daily work and when they find the work is going well, they are not eager to invest. Because its new technologies and you know, changing things that they worked before, it's a little bit about what's on top of your mind. Sometimes they're not that data driven. They think they have done it for twenty years and it will be the same next twenty years as well.
160.	QY	What about how should data be managed? For example, who should manage the data?
161.	JN	Yeah, I don't have a good answer to that. We usually work with data warehouses and so on. It's not a single solution, of course. In bigger companies, we think that securing data quality in a big data warehouse or something like that, enables them to be free in their tools and on their front end. So they don't have to be, sometimes they take data directly from the source, and that makes them more vulnerable if they have to change something in the future, because they have to do everything from scratch. So that's a little bit of different approaches to try to do some middle layer or something, also from integrating different sources. So that is quite a normal day for us to talk about to integrate different systems in the kind of data warehouse.

162.	RM	With regards to user access, we talked about it briefly before. When it comes to BI systems, how should access be distributed? Should access to data be limited to subject experts or distributed to the whole organization?

Appendix 7: Interview Transcript [Rsp6]

Date: 13:00, 26th of April, 2018

Duration: 32 minutes

Interview format: Phone call

Transcribed by: Qinyan Ye

Transcription checked by: Robi Morro

Transcription date: 27th of April, 2018

Researcher 1: Robi Morro: RM

Researcher 2: Qinyan Ye: QY

Interviewee: Tobias Sjölin: TS

Company: Boozt Fashion AB

Row	Speaker	Text

1.	RM	Ok, so, the purpose of this study we would like to understand how organization is data-driven by analytics, what kind of practices they employ in their everyday processes. And we would like to assure you that the study will be treated in very high confidentiality, and only for the purpose of studies here at Lund University. And another thing we want to ask you is do you mind if your name and your company name appeared on our paper?
2.	TS	No, that is alright. You can choose if you want the name or not
3.	RM	OK, and also, we are going to inform you that we will be recording the conversation also.
4.	TS	Sure
5.	RM	Ok, thank you very much. So maybe to start with, could you please tell us a bit about yourself, and the company that you are working for, like how long you have worked there?
6.	TS	Yeah. So I am working at Boozt.com or Boozt Fashion AB as it's called. And it is an e-commerce company. So we sell clothes online, or fashion online. And I have been at Boozt for eight years, in December. And my title is the Project Director. So I am the Project Director for the platform team, which means that, the platform team is the team that is creating all the tools and systems for the company to run. So we have made our own web shop, our confirmation system, warehouse systems and so on, so all the core systems we made ourselves from scratch. So my role is to coordinate resources, and to specify solutions and run projects, and things like that.
7.	RM	OK
8.	TS	So a bit about Boozt also. We are a team of 220 people, and we have an office in Malmo, and we have a warehouse in Ängelholm and we are 60 people in the platform team, so the developers.
9.	RM	OK. So have you worked with business intelligence projects or tools previously?
10.	TS	Yeah, I mean, not in Boozts or?
11.	RM	Oh, even in Boozts.
12.	TS	Yes. It is like this. We always work with business intelligence. We use data all the time. It is a data-driven company. In terms of tools, we have worked with first tool called Pentaho and another tool called Qlik. I know you have questions regarding this later on. But yes, we work with this now.
13.	RM	Ok. So the company has implemented business intelligence systems since it is started? If I understood you.
14.	TS	Yes. You know we did not have tools in the beginning maybe. But we always said data mining and staff like that. We are doing a lot from the data basis. So it is still data-driven, we do data extract, but it is not like with the tool from the beginning.

15.	RM	Aha, so when did you start with these new tools?
16.	TS	I think Pentaho is the first tool we start using. I believe it was in 2009 or 2010. No sorry, wait, 2013 must be.
17.	RM	Ok
18.	TS	Then we switched to Qlik instead of Pentaho.
19.	RM	OK, what are the reasons maybe for choosing to use these two tools?
20.	TS	First of all we have that pain point so we need that tool to organize data and to be more efficient. So that we select Pentaho, but then the users of these tool they don't think that it was as good as Qlik, so after a year around, we switched Pentaho to Qlik instead.
21.	RM	Ok. Now my colleague Qinyan will continue with next set of questions
22.	QY	Yes, in the next part we will focus on the platforms. That is say business intelligence systems. The first question will be what are the BI systems or tools are your organisation use. I think you have mentioned Pentaho and Qlik.
23.	TS	Yes, we are not using Pentaho anymore, we are using Qlik now. And to answer the next question also, Qlik is very easy to use, it is very user friendly. The other staff that there is a challenge with Qlik is that it only runs on Windows server, so it means you need to have proper infrastructure. But it is very user point of view to use.
24.	QY	Ok, and the next question will be are these BI systems integrated with other systems, for example sales or accounting systems?
25.	RM	Yeah, not really the way you mean, but the thing is like that, we do a lot data extracts from our databases directly to the different systems. But it does not go through Qlik. Qlik is our discovery tool, so we use Qlik to look at the trends, or you know different statistics to from dashboards, and staff like that. When we pipe our data into our systems, we go directly from our databases into these systems like CRM and accounting.
26.	RM	Ok, for example, just to ask questions building on from your answer, so unstructured data from for example Facebook or other social media, how do you deal with that one.
27.	TS	We actually we use third-party, a company called Funnel.io. It is a Swedish company. They extract data from Facebook and say Instagram, staff like that, and pipe them into our Google analytics. So we actually use Google analytics as well. We do not really classify it as BI tool. But Google analytics is something we use and have used from beginning, and it is very powerful. But it is not, Google analytics is more a statistic reporter, not a statistic report, but Qlik is more, you can built up yourself, and do different dashboard, and staff like that. Google analytics more statistics, so we don't classify it as BI system, but we use it a lot for our decisions.

28.	QY	So from your answers, I think these BI systems is for example predictive? Do you see it as prescriptive, because you say it predict the trends.
29.	TS	So if I answer that one, we have prediction dashboard in delivery to the warehouse, and staff like that. But we create these ourselves, so we do not use Qlik, the BI tool, as a predictive or prescriptive, we call it more a discovery tool. So we discover different facts and trends around like customer, what they do, and you know different markets, and staff like that. how is are the Finish customers for instance react on the change of say shipping fees or something like that. We also use Google analytics for that as well. So Qlik is more about discover, we discover different things by looking at the data, combining different data, and so on.
30.	QY	Yes, the next question. How does your BI systems support collaboration decision making? Does this tool encourage collaboration between decision makers?
31.	TS	So again, I mean, we have argument sometime on what to do, which colour or button should be, and again we use Google analytics mainly. So we do that A/B test staff like that. We put that one colour, we see the conversion on that one, and then we put another colour and we see how that colour performs. So everything is data-driven, and we check our data and KPI and how that performs. But it is not necessary that we use BI system in that sense like Qlik. But we use Qlik, we can see sales, and staff like that. We have a team called merchandizing, and they are doing all the buying together with buyers. And merchandizing are extracting all the data from Qlik to serves to the buyers to let them know what to buy. So they can get that ok you need to buy 2000 pairs of Blue Jeans in these sizes and so on. So they get very exact data based on our sales and returns from the past. They can get and serve these data to the buyers so that they know almost exactly what they should buy.
32.	RM	So basically you actually can do also prescriptive analytics with the systems that you mentioned.
33.	TS	True, very true, yes, so in that sense, when we are doing that, we serving that data, yes, we can do prescriptive.
34.	RM	OK, ok, that is good.
35.	TS	So we are trying almost to automate the buying process as much as possible.
36.	RM	Yes
37.	TS	So, for some cases we do not even need to go out to the Brand to look at the cloth and staff like that. We can look at the catalog, and say we send out an order automatically based on our data
38.	RM	Wow, that is very impressive
39.	QY	Ok, so I think the next question has also been answered, so we move on to the people part
40.	TS	Yes

41.	RM	Yes, so do you have a dedicated team of data analysts in Bootz?
42.	TS	No, ok, this will be a long answer, but we used to have what we called BI engineers in the platform team, that set up data and staff like that to prepare BI tools with data. But they are not the ones doing data analysis. So the data analysis, we have people in the different teams, so we do not have a dedicated team, but the data analysis, they are in the teams instead. So we have like one person in the marketing team, and one person in the buying and merchandizing team doing this data.
43.	RM	Ok, that sounds like a truly data-driven company, actually.
44.	TS	Yes. What I am trying to say is it will be weird to have a specific team for this, because then it will be not so tight with the business. We want to have like a person dedicated in the business team, so it is not so, I will call it, it should be very approachable, the whole data thing.
45.	RM	Correct, correct. So you would say that almost every department is using BI tool, for example, Qlik?
46.	TS	Yes. But more and less also. Some teams use less and some teams use more. So marketing is using it a lot, buying merchandizing is using it a lot, we also have our e-commerce teams which is responsible for the conversion rate on the page of course and something like that. But then we have teams like the finance team maybe not using this as much. And finance is like they handle all the invoices and staff like that. They already have the data they need in their tools, and they don't really need to discover new staff. So it is more for the marketing and other team that is doing that. And we also doing it of course.
47.	RM	Ok, so you would also say that decision makers are actually empowered with right skills to interpret data?
48.	TS	Yes
49.	RM	Ok, so the fourth question is probably a little bit confusing, so we can move on the number five, how do you store data. Is it centralised or decentralised?
50.	TS	So we have around 17 different systems that we created ourselves. So all of these have different databases and things. But what we do is we centralize all the data. So we push in all the data into data warehouse, and then Qlik is using that to show dashboards and staff like that. Then we also have like google analytics, but we try to pull google analytics data also into Qlik, what they need to see, and staff like that.
51.	RM	Ok
52.	TS	We want to have it centralized.
53.	RM	So is it centralized or you want to have it centralized?
54.	TS	It is centralized and that is what we wanted it to be as well.
55.	RM	Yes, yes, correct.

56.	QY	Ok, we will continue to the third part, processes.
57.	TS	Yeah
58.	QY	We will talk about the activities do you have in place to instil data-driven decision making and knowledge generation? For example, in some companies, they have some physical screens around displaying data, and for example, some companies have stand-up meetings showing data everyday.
59.	TS	Yeah. So we have dashboards all over the office, so the physical screens. And they are all showing like the numbers, like today's number on the sites, its conversion rate of orders, and things like that. But there are different dashboards as well. Some teams have on their physical screens they have more information and some team have less. So we have adapted each physical screen onto each team with specific information.
60.	QY	Oh, so you mean the physical screen is on the wall?
61.	TS	Yes, it is like big TV, but it shows dashboard.
62.	RM	Wow, that sounds kind of amazing place.
63.	TS	Yes! And also some people, we had a discussion, we went to the stock market, it is a bit sensitive information sometime. The thing is that it is not sensitive for visitors to see because you only see is like a snapshort, you only see today's data, that is not really critical information.
64.	RM	Wow, that is really impressive actually.
65.	QY	Do you have some meetings? For example, stand-up meetings every day to talk about metrics?
66.	TS	Well, we have stand-up meetings in some team, but that is more for the agile development, it does not have anything to do with data, and staff like that. But emails being sent out every morning that showing the sales, so there are key people get this email, the decision makers get the email, on the sales and performance. So we show like the margins, the conversion rate, the actual budget, and how much we sold and things like that, so that is prepared and sent out every morning.
67.	QY	Ok, now let us move on to the second question. How are users involved in the implementation of these BI tools and technologies? For example, do you ask users about their requirements when implementing the systems?

68.	TS	Yes, that is all we do everything we do with the tech part. We always involve the business as much as possible. So, what we try to do is we try to get the first version out as fast as possible, like version one, and then we iterate. We try to do as little specification as possible, so we try to say ok this is phase 1, and then we send out and we can talk to business, so we sit down with the business all the time, and ask them for inputs, ok how do you think this should be, what data actually you want to see. For us it is extremely important the business answers the question why they need this data because then we can understand better on how to do this. Because sometimes people can say "I need this data", then we do that, but is it not what actually they wanted. So the answer is "I need this data because I am going to show this report for a warehouse" something like that. Then you can say "ok we have other data we can show you them", so that is why we always involve business in all of our decisions that we do.
69.	QY	Yeah, great. So the next question is "Is there a person in every department who is advocating these data-driven activities"?
70.	TS	Yes. We have one of the founders here, he is e-commerce director now. He is always been advocating from the beginning that we need to do everything data-driven. As soon as we have an argument on what to do, we always do based on facts instead. So all the team is doing this. He is the biggest champion we have. But it is also, if you need to say win an argument, you need to also present facts. It is always facts against facts.
71.	RM	Wow, Ok.
72.	QY	But do you have champions in for example each department or each team?
73.	TS	Yeah, we always, not so much discussion about feeling, you know I feel I should do this. All the teams in our company they are talk about data and KPIs when we do staff.
74.	RM	So there is no particular like champion?
75.	TS	No, we all are. We have to be. Because it is very hard when people are presenting some nice picture and dashboard, it is hard to say "oh I don't agree because I don't think it is nice" or something like that. So you always have to come prepare with data.
76.	RM	Wow
77.	QY	That means everyone is willing to use this analysis system.
78.	TS	Yes.
79.	QY	Ok, we will skip number four. And number five, in your opinion, which processes of current BI systems is/are the most challenging?

80.	TS	Ah, that is a good question. If you look at all the data and BI staff, the challenging part is do we have the correct data. Have we logged in everything that we need to log. Because you end up sometimes in discussion we can't see that because we don't have information about it. The challenge is to prepare the system to make them gather as much information as possible. Then I mean, there is no really, the way we have done it is that we don't have any challenge that we can solve ourselves. We don't depend on the BI system, so if it is not working we gonna do it in the new dashboard something like that. So the current BI system works fine, but if you don't have data, then it is very hard to digest data and use it.
81.	RM	True. The last part is the organizational context. So we aim to understand performance related to BI.
82.	TS	Sure
83.	RM	How would you describe support from executive for business analytics. For example investments and developing human skills, and trainings.
84.	TS	So as I said before, this comes from the top level. Even our board is very into this whole data-driven part. The whole organization is just data-driven from the core out. There is always support for spending money on this to get all the nice test. The thing is we always, we don't like to just buy systems or test, we need to have a reason for that. So we always want to be very sure of what we doing and what we buying before we do something. It should not be that we invest just because we need to invest. It should also fulfil a purpose in the whole thing. But there is no problem to do that if there is a purpose for the whole thing.
85.	RM	And do you have any policies and strategies that support data-driven decision making?
86.	TS	Not really like defined processes. We are doing that all the time. It is not something like we have to follow like a flowchart something like that. It is more like we always do that.
87.	RM	Ok, and in addition, so you don't have a data strategy, or?
88.	TS	Ah, well, it is how you define it. But we have a data strategy. I mean we have a data strategy for all of our systems. How they should store data and something like that.
89.	RM	Yes
90.	TS	But then we also have data strategy on how to use it as well. So we have a data strategy, but how does it working, I don't know if another company can copy it because I think each company should have its own strategy to make sure it is very focus on the core business.
91.	RM	But you mentioned early that you use data and compare that with your KPIs.

92.	TS	Yes. So we have all our KPIs that showing all the data we have gathered. We have like conversion rate, and you know KPIs on how fast we packet orders in our warehouse, and KPIs on the loading time and everything like that. So everything we do, it is like we measure it.
93.	RM	Yeah
94.	TS	Our COO, he has been the Chief Operating officer for SAS before, you know the airline company.
95.	QY	Yes
96.	TS	And he always says that if you are not measuring, you are only practicing. You have to measure everything.
97.	RM	True. Yes, correct. OK, how often is your team trained on the power of data and analytics usage?
98.	TS	We kind of show people, mainly. You know we sit down and say "This is all I have these three things, and I am not sure how this work". Then we say "ok, we sit down here and we can go through all the data is working". When you show people, you open up a world for them. You say ok but we can do more things.
99.	RM	Yes
100.	TS	And we have some very curious people here in the company. All the people they want to learn and see how they can use things and staff like that.
101.	RM	Wow
102.	TS	So yeah, we sit down with people we show them. And we give them the power as well. We give them access as much as possible so they themselves can work with the data.
103.	RM	OK you can say, you could actually say that it is very self-driven also.
104.	TS	Yes, yes. We like to give people here the power to do the things themselves. It is much more efficient if you have 220 people thinking and doing staff instead of maybe only 5 or something like that. So we would rather to give people more power to get an access to think or to keep an eye on the sites and all the KPIs and something like that.
105.	RM	En, Ok. Question number five, as I recall, you always question when someone wants a certain system or something.
106.	TS	Yeah.
107.	RM	What I would like to understand more is what role do, because you come from the IT side, so what role does a business and the IT department play, what different roles?

108.	TS	Yes, it is kind of goes hand in hand. We pushed for a project recently, we said, we need to have a better KPIs on how fast we get to orders out of the customers, you know, the whole chain, from the finance a place, to the things we distribute, everything.
109.	RM	Yes
110.	TS	So then we said to the business "look, we need to do this, we need to this is our idea". The business then said "Oh, that sounds super, lets do that." To stand at the business said, the business can also said "we need to see this here". So it is not really, we don't have any like block between the teams and something like that. We always focus on, ok, what is best for the company, how can we improve, and how can we make it better for the customer, so the customer is in the focus all the time. It is not something like ok finance team, platform team and marketing team. It is always like "ok, everyone is together now, how can we do it better, how can we show it and make it nice."
111.	RM	So in my understanding, you actually look at the overall business strategy and make decisions. Every department look at the overall strategy and see what part can we play in this.
112.	TS	Yes, exactly.
113.	RM	Ok that sounds really good. And the last but not least question is does BI allow you to become more familiar with the market trends in the area of your business?
114.	TS	Yes. I mean we could say, for instance these mobile users. I think it is in 2016 or something that we can see when from the 30% to 70% just in a year. We can see immediately that all the customer pattern changes, you know everyone moves to mobile or tablet instead. So we had to change and said we need to focus on mobile or tablet to make sure they have nice experience.
115.	RM	Ok any other thing that you would like to add that you think would be beneficial to our study?
116.	TS	Yes. I don't know if you have heard that. There is a quote, I think it is from Netscape CEO back in the days. He always says that if you have facts, then present facts. If all you have is opinions, then you go with mine. That is why it is always important to present with fact. The opinion, everyone has an opinion.
117.	RM	True, true.
118.	TS	That is a good one, I will use that one.
119.	RM	That is really a good one. So thank you so much.
120.	TS	You are very welcome. Do you have any other questions now, after I answer all these ones?
121.	RM	May be just to understand about your daily business. How do you conduct, for example in your everyday business at Boozt. For example, if you describe your day at work, what would it look like?

122.	TS	Yeah my day work, it is just like, we have a stand-up meeting in the platform team, it is 9 o'clock. So we have 60 people in all the different teams in the platform team, so we have small sub-teams. We standup at nine, then it is mainly just try to push projects in the right direction, to make sure everything is solved, and then there is business meeting as well, so we meet the business and talk to them, ok what is important now, or do we need to work on? We use data of course to lead the direction of the whole thing. So I mean, then we get some focus, when they have boardmeetings. Sometimes we need to focus on cosmetic part or sport area something like that. We push forward, put in more resources.
123.	RM	And everything is data-driven
124.	TS	Yes
125.	RM	Ok
126.	TS	Sometimes we do something that is not data driven, sometimes we do like ok I will use green colour just because it is nice. But what I mean, it makes sense to use data, it is very very helpful, because you always feel more secure as well because you have the data backing up. We kind of, we tell our developers, ok you can do whatever you want, you can do mistakes but just follow up with data see how it performs. Do a change, if it is bad, then we do something else, then we change. If it is good, then we work toward our goal.
127.	RM	OK, can you say that, by the use of data, you have increased, for example, your business value, like increase in the profit, compare to other times that you did not use as much, because you mentioned there was time you only extracted data from database.
128.	TS	Yes, I mean, when we have all the buying we doing we now with all the clothes, now everything is data-driven, we always know what to buy all the time. In the beginning we did not have the data, we have to more rely on this looks nice something like that. But now we are very much secure in what we are buy and we can put more money to buy different things because we know that it will sale.
129.	RM	Yes, ok, ok, and they do sale when you buy them.
130.	TS	Yes, do sale.
131.	RM	Do you have anything else, maybe, Qinyan?
132.	QY	Because I just hear that, I am wonder if that, does your company have a culture that encourages you to try based on data. For example, do you have a high tolerance on making mistakes?

133.	TS	Yes, I mean we try to fail as fast as possible. So, I mean from the tech side, all the new people when they get in, they suppose to take down the site one time within the first two weeks, that is a kind of ritual they have to go through. Then they will sweat a lot, and they will fix it. So from my point of view, it is very ok to fail. We know that things are going to go wrong, the only thing is we will focus on how can we repair things if go wrong. We are very fast in fix things going wrong, which makes it more comfortable to do mistakes, to try more things and the staff.
134.	RM	Ok, I think we are out of questions for now.
135.	QY	Yes.
136.	TS	Super! Yes.
137.	RM	But if for example, if we need to know a little bit more is it ok to send you an email and ask?
138.	TS	Absolutely, just email me, I will see what I can reply.
139.	RM	Thank you so much!
140.	QY	Thank you so much!
141.	TS	Well, thank you, and good luck with the study!
142.	QY	Thank you.
143.	RM	Thank you so much Tobias, have a nice day!
144.	TS	All right, thank you, bye!
145.	RM	Bye!
146.	QY	Bye!

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